JANIS 84
CHAPTER V

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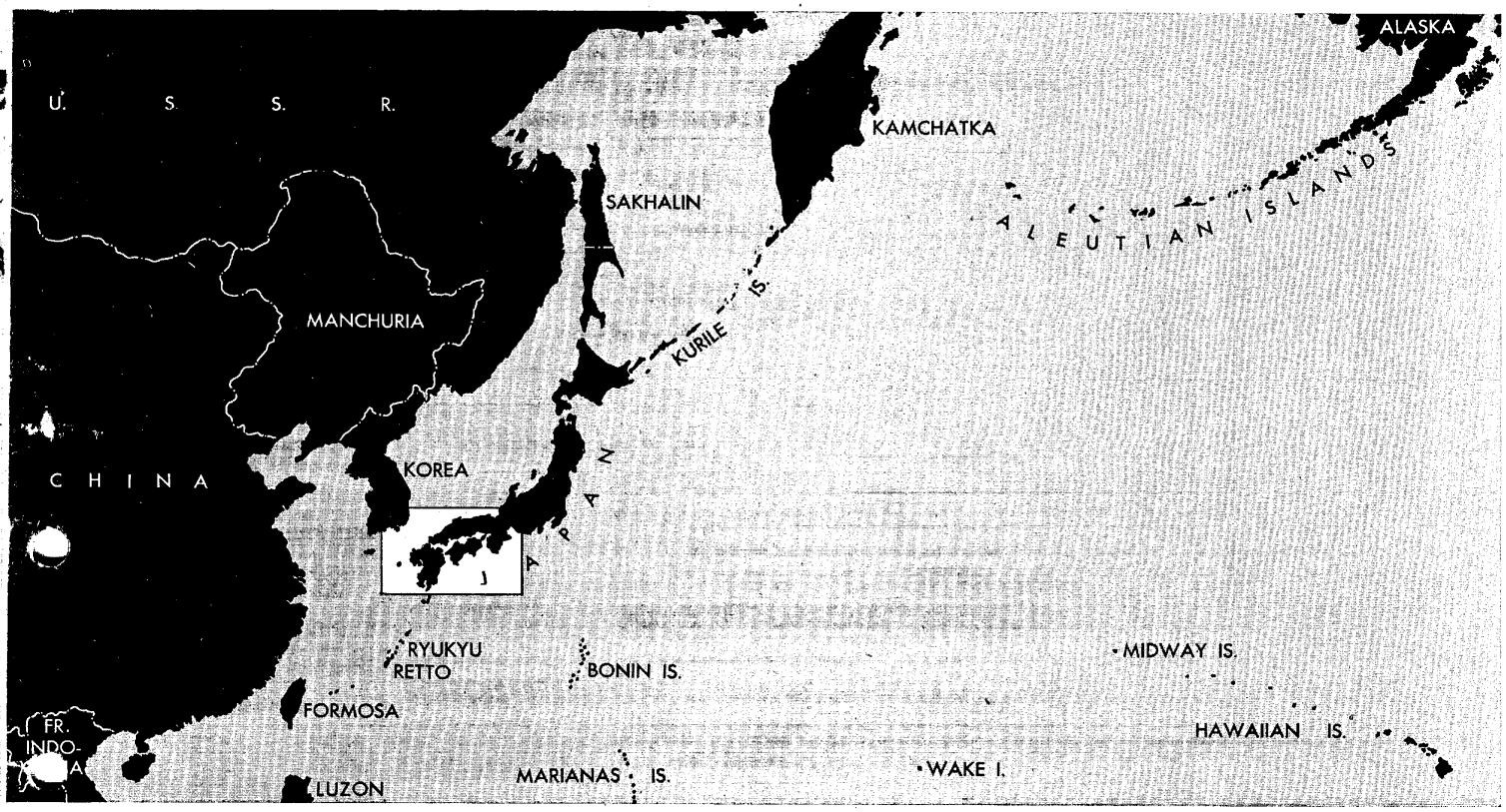

JOINT ARMY-NAVY INTELLIGENCE STUDY

OF

SOUTHWEST JAPAN:

Kyūshū, Shikoku, and Southwestern Honshū

CLIMATE AND WEATHER

AUGUST 1944

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Note: This chapter is based upon information available in Washington, D. C., on 1 August 1944.

Chapter V

CLIMATE AND WEATHER

50. *Introduction*

The meteorology and climatology discussed in this chapter are limited to an area embracing Kyūshū, Shikoku, and southwestern Honshū, the latter area being defined as that portion of Honshū south of 36°N and west of 138°E. In some instances, it has been necessary to enlarge upon the area in order to describe more clearly certain salient features of the general climatic and synoptic regimes. In the interests of economy of space and time, the detailed analyses of synoptic weather and climatological data have been limited to 17 stations in the area. For a more complete analysis of the synoptic weather information the reader is referred to AFRWX Report No. 639 on Japan, now in preparation. For further climatological data the reader is referred to Navaer 50-1R-60, U. S. Navy Reprint of the Climate of Japan, by T. Okada. Additional information and analysis can be obtained from the Commanding General, Army Air Forces, O C and R, Weather Division, Washington, D. C., and Office of the Chief of Naval Operations, Aerological Section (Op-34-E), Washington, D. C.

51. *General Climatic and Synoptic Regime*

A. Major climatic characteristics and controls.

The climate of the Japanese islands is determined largely by the interplay between 2 great centers of action, the North Pacific anticyclone and the Asiatic anticyclone. The dominance of the former results in a general southerly air flow over the archipelago often attended by widespread areas of low-level cloudiness and heavy rains. The dominance of the Asiatic anticyclone results in a general northerly air flow over the archipelago, often attended by low-level overcast with rain or snow along the western and northern coasts and slopes and by fair weather over the southern and southeastern coasts and slopes. Occasions when high pressure overlies the Japanese islands are attended by generally fair weather and light winds over the entire area.

The mean pressure and air flow for the month of January are shown in FIGURE V - 1. During the winter season the Asiatic anticyclone is dominant, with north to northwest winds of continental origin flowing across Japan. Overcast conditions with frequent snows or rains prevail along the western and northern coasts. Areas along the southern and southeastern coasts which lie in the lee of high mountains have a preponderance of fine weather. In all instances it is necessary to consider the locality in its relation to the surrounding topography in order to understand detailed analysis of synoptic weather and climatological data (FIGURE V - 31).

The mean pressure and air flow for the month of July are shown in FIGURE V - 2. By this time, the Asiatic anticyclone has been replaced by low pressure with weak gradients, while the Pacific anticyclone has moved northward and closer to the Asiatic mainland. In summer, air flow over the Japanese islands is much more variable than during the winter but is prevailingly from a southerly direction. Because of their long trajectory over the ocean, these air streams are heavily laden in their lower levels with moisture which is readily precipitated in local showers over the Japanese mainland. At times the weather becomes settled and periods of fine weather result. These periods of dry weather are most likely to occur in August and that month is therefore the most favorable of the summer months for operations of all types.

Variability in the weather is occasioned by the passage of extratropical cyclones. These storms, formed in the zone of converging winds between the 2 great anticyclonic centers of action, move in a general northeasterly direction toward the Aleutian area. In winter most of these storms are formed and pass well to the south and east of southern Japan, but a small number pass near enough to the islands to cause adverse weather. In spring the zone of converging winds begins a northward trend, and the frequency of adverse weather over southern Japan increases. During the last 2 weeks of June and the first 2 weeks of July the zone of convergence overlies southern Japan, and along it moves a series of weak, slow-moving cyclones. They are attended by a marked increase in low-level overcast, relative humidity, and precipitation. The season is known in Japan as the season of the "Plum rains," or the "Bai-U" season, and is perhaps the least favorable season of the year for military operations.

In midsummer cyclonic storms are fewer in number and ordinarily reach only the northernmost portions of the Japanese archipelago. Summer rains over southern Japan are largely in the nature of local showers. In early autumn the zone of converging winds, with its frequent extratropical cyclones, returns to southern Japan, bringing adverse weather—frequent and heavy rains, low-level overcast, strong shifting winds. In some years the September rains may exceed the amounts received in June.

Typhoons may cross southern Japan at any time during the typhoon season (May through November), but are most likely to occur in summer or early autumn, with maximum frequency in September. Their occurrence at any other time must be considered very unusual. These severe tropical storms most frequently originate in the region between the western Caroline, the southern Marianas, and the Philippine Islands. The average number of storms in the whole region is 25 each year, but the number in specific years may vary between 50% and 200% of the average number. Japan proper is affected by an average of 12 typhoons a year. Storms which occur early in the season have a tendency either to advance westward to Asia and dissipate, or to recurve over the ocean and pass southeast of Japan. In September, typhoons usually first appear between Saipan and Palau Islands, and move slowly west-northwestward to east of Formosa where they recurve to the northeast. After recurving they move with increasing speed and cross over or pass immediately south of the main Japanese islands.

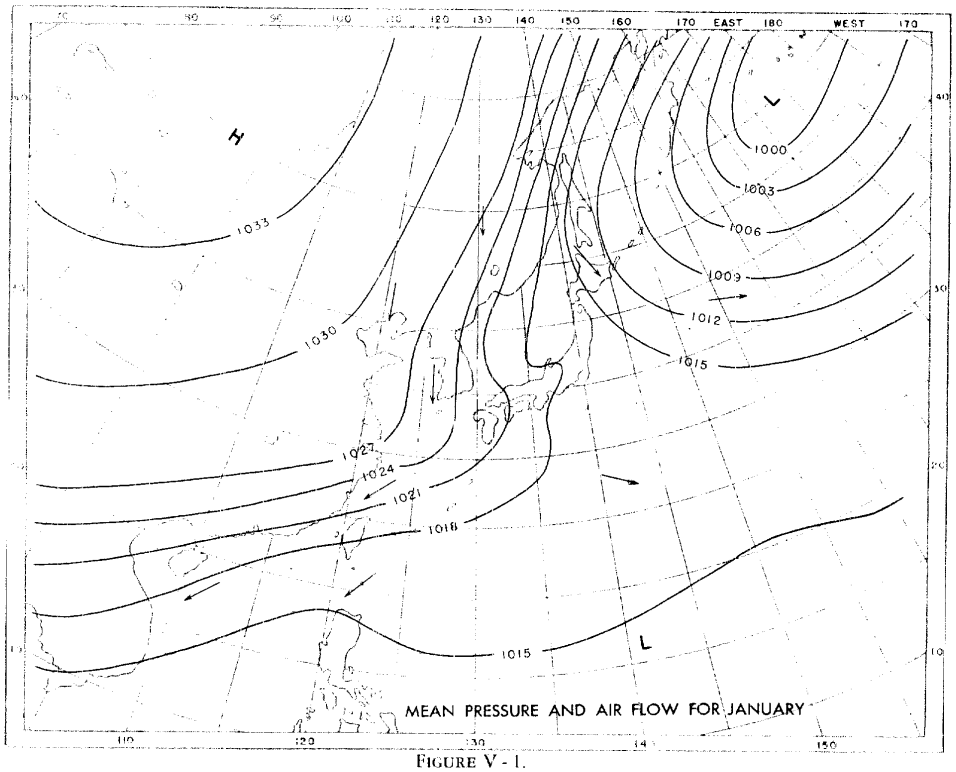


FIGURE V - 1.
Mean Pressure and Air Flow for January

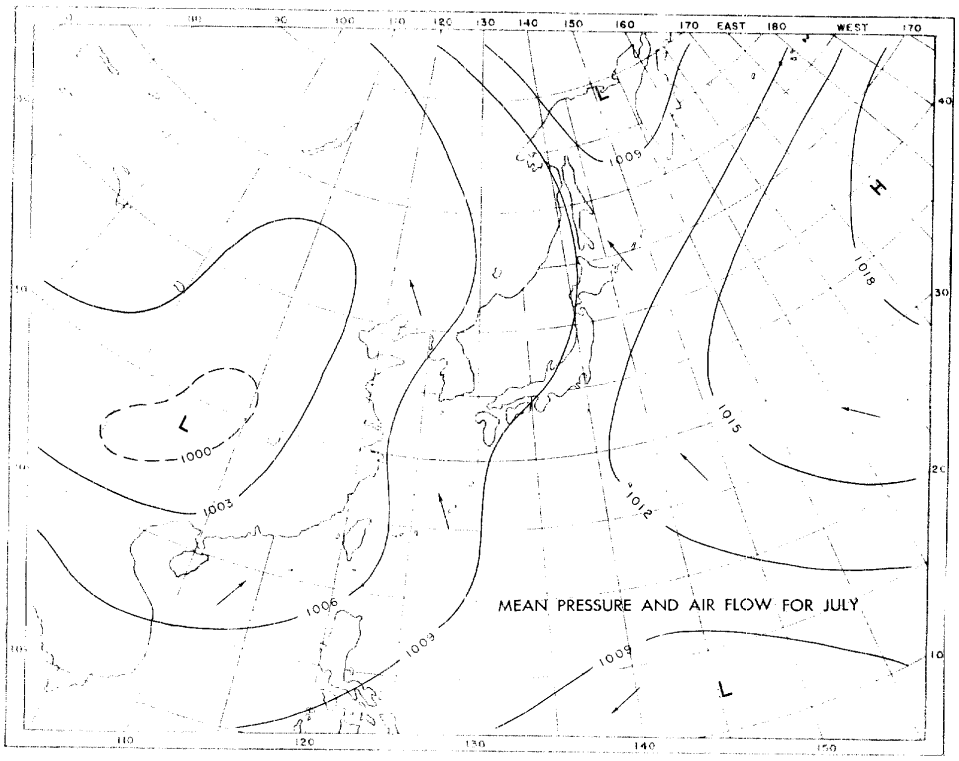


FIGURE V - 2.
Mean Pressure and Air Flow for July

TABLE V - 1

TYPHOON FREQUENCY

West Pacific Entire Region	JULY	AUGUST	SEPTEMBER	OCTOBER
Max. No.	7	6	10	7
Min. No.	0	0	1	0
Av. No.	3.4	3.6	4.1	3.2
Japan				
Av. No.	1.1	2.0	2.4	1.5

Tropical storms vary greatly in size and intensity, from small storms of only local extent to great cyclones with radii of several hundred miles. A fully developed typhoon may have a heavy rain area with a radius of perhaps 150 miles, and an inner ring with winds of hurricane force (75 m.p.h. or higher) with a radius of 50 miles. Wind speeds may exceed 150 m.p.h. near the center of the storm. The storm itself moves forward with speeds of 8 to 12 m.p.h. until it recurves, after which the speed increases until rates of movement comparable to those of extra-tropical storms are reached (25 to 35 m.p.h.). Much of the damage resulting from the storms is caused by the very high tides which follow in its wake. Operations of all types must necessarily cease during the passage of a typhoon. Widespread areas of low-level overcast, torrential rains, extremely high wind speeds, and excessively high tides all combine to make a typhoon one of the most terrible of nature's phenomena.

Details of the frequency of synoptic weather conditions and flow types will be found under succeeding paragraphs. Further information on the frequency of meteorological elements is given under "Weather and Operations" (Topic 52) and in the "Climatic Statistics" (Topic 54).

B. Synoptic aspects of climate.

The weather patterns over Kyūshū, Shikoku, and southwestern Honshū have been classified according to the principal free-air flows at the gradient level. Of the 11 types of flow and systems, 6 are of primary importance since they occur at least 10% of the time in any one season. These 6 primary types are: northeast, southeast, southwest, northwest, north, and ridge or *high* type. The 5 secondary types are: east, south, west, troughs including *lows* and typhoons, and cols or variable.

The following table indicates the percentage frequencies of primary and secondary types of free air flows and systems over Kyūshū, Shikoku, and southwestern Honshū during each season. The data were obtained from a 5-year record (1927 through 1931) of synoptic observations taken twice daily at 0600 and 1800 135th east meridian time.

According to the tabulation it is evident that air flows from the northerly directions over Southwest Japan at least ⅔ of the time in winter. Conversely, in summer, southerly air flows predominate, but occur somewhat less than half of the time. These frequencies illustrate a monsoon circulation, that is, one which reverses itself seasonally. The summer monsoon appears to be much less persistent than the winter monsoon.

Of the 11 types, the NE type is the most frequent, predominating in winter, spring and fall. In summer the SW type predominates. Furthermore, the N and NW types have similar orographical and climatic effects on Kyūshū, Shikoku, and southwestern Honshū, and if these 2 types were combined, they would occur in winter 37% of the time, compared with 29% for the NE type during the same season. In fall and spring, however, the NE type occurs more frequently than the combined N and NW types.

TABLE V - 2

SEASONAL PERCENTAGE FREQUENCY OF VARIOUS AIR-FLOW TYPES

SEASON	*Primary Types* FLOW DIRECTIONS						*Secondary Types*				
	NE	SE	SW	NW	N	RIDGES AND HIGHS	E	S	W	TROUGHS, LOWS, TYPHOONS	COLS AND VARIABLE
Winter (December-February)	29.1	3.1	3.8	20.1	17.3	14.7	5.4	1.0	0.9	1.8	2.8
Spring (March-May)	23.9	6.7	13.2	8.1	5.8	20.0	7.1	5.9	2.3	3.5	3.5
Summer (June-August)	10.3	13.5	26.6	3.8	1.1	14.4	4.0	6.8	4.8	8.8	5.6
Fall (September-November)	30.4	9.3	3.8	9.6	5.9	17.5	9.3	2.3	1.7	3.9	6.4

(1) NE type of free air flow.

The NE type of free air flow during the cold half of the year is associated with the winter monsoon circulation of eastern Asia, and is controlled to a great extent by a strong surface high pressure center in Siberia. Northeasterly free air flow is prevalent about the perimeter of the high cell, in Southwest Japan. In spring and fall, however, this type of air flow is partially associated with the circulation accompanying centers of high pressure moving eastward over northern Japan. This air flow is usually associated with a polar air mass. Occasionally, throughout the year, but particularly in June, this type is associated with frontal waves moving eastward just to the south of or over this area. TABLE V - 3 gives the per cent of observations with various weather conditions at the specified hours 0600 and 1800.

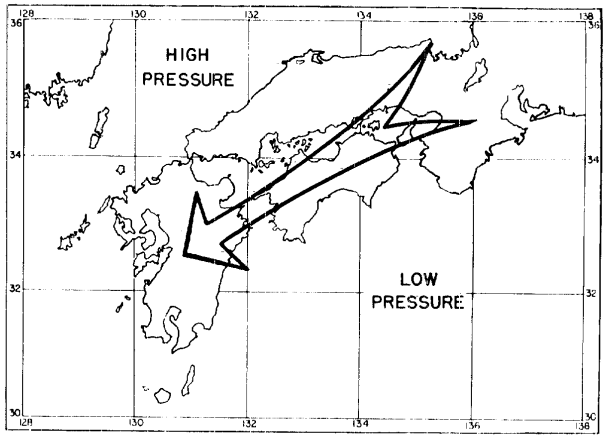


TABLE V - 3. SUMMARY OF LOCAL WEATHER FOR NE TYPE

	Fog	Pcpn	Thdstm	Ovc with pcpn	Obstruc to vsby*	S, N, or Kn # amts ≥ 0.4	Clds ≤ 0.3 with no obstruc to vsby	Surface winds 3-12 m.p.h. without pcpn	Surface winds > 12 m.p.h. without pcpn	No more than 0.3 S, N, or Kn # clds and no obstruc to vsby	No low clds > 0.5 and no obstruc to vsby
WINTER											
Kagoshima											
0600	0	9	0	9	9	22	26	50	0	82	44
1800	0	11	0	11	11	29	24	40	4	79	47
Nagasaki											
0600	0	7	0	7	7	11	33	50	3	92	54
1800	0	10	0	9	10	14	23	69	4	89	48
Shimonoseki											
0600	2	10	0	10	11	7	23	52	14	87	31
1800	0	9	0	7	9	9	15	67	7	91	25
Hamada											
0600	0	21	0	20	21	47	13	69	4	58	24
1800	0	16	0	15	16	45	14	57	9	60	25
Kōchi											
0600	2	6	0	6	7	13	31	49	1	89	61
1800	0	12	0	12	12	21	36	44	2	85	57
Ōsaka											
0600	2	9	0	9	10	9	28	33	3	90	39
1800	0	14	0	14	14	13	28	70	3	86	41
Miyazu											
0600	0	36	0	36	36	40	6	21	4	60	10
1800	0	28	0	28	28	31	6	35	9	68	15
Nagoya											
0600	0	11	0	11	11	20	34	70	4	83	50
1800	0	10	0	10	10	14	42	46	38	89	61
SPRING											
Kagoshima											
0600	0	12	0	12	12	36	21	52	1	73	43
1800	0	14	0	14	14	31	23	63	1	82	57
Nagasaki											
0600	0	11	0	11	11	30	27	53	10	80	58
1800	0	11	0	11	11	22	28	69	18	87	65
Shimonoseki											
0600	1	15	0	15	16	12	24	57	3	84	36
1800	0	8	0	8	8	11	17	82	3	92	42
Hamada											
0600	0	22	0	22	23	42	17	59	5	68	41
1800	1	14	0	14	15	36	19	58	15	76	44
Kōchi											
0600	1	17	0	17	18	32	24	45	0	76	57
1800	1	12	0	11	13	19	19	42	3	87	57
Ōsaka											
0600	0	14	0	14	14	17	19	52	2	86	36
1800	0	8	0	7	8	10	27	61	19	91	49
Miyazu											
0600	0	17	0	17	17	26	11	39	4	77	23
1800	0	20	0	20	20	28	13	61	9	77	37
Nagoya											
0600	0	16	0	16	16	28	39	57	18	82	61
1800	0	6	0	6	6	14	30	37	53	91	59

	Fog	Pcpn	Thdstm	Ovc with pcpn	Obstruc to vsby*	S, N, or Kn # amts ≥ 0.4	Clds ≤ 0.3 with no obstruc to vsby	Surface winds 3-12 m.p.h. without pcpn	Surface winds < 12 m.p.h. without pcpn	No more than 0.3 S, N, or Kn # clds and no obstruc to vsby	No low clds > 0.5 and no obstruc to vsby
SUMMER											
Kagoshima											
0600	6	10	0	10	16	33	14	40	0	74	58
1800	0	0	0	0	0	18	18	84	0	89	53
Nagasaki											
0600	0	8	0	8	8	15	20	46	0	90	66
1800	0	0	0	0	0	7	31	87	9	96	62
Shimonoseki											
0600	0	6	0	6	6	12	16	48	2	90	44
1800	0	0	0	0	0	0	22	89	7	100	49
Hamada											
0600	0	10	0	10	10	55	18	65	2	65	49
1800	0	2	0	2	2	36	18	91	4	73	42
Kōchi											
0600	3	11	0	11	14	21	29	34	0	86	63
1800	0	11	0	9	11	26	9	22	0	80	40
Ōsaka											
0600	0	9	0	9	9	8	24	37	0	91	41
1800	0	4	0	2	4	6	26	78	11	91	54
Miyazu											
0600	0	7	0	7	7	8	9	13	2	93	27
1800	0	9	0	9	9	11	24	71	2	89	50
Nagoya											
0600	2	13	0	13	16	26	20	56	2	78	41
1800	0	7	0	7	7	18	15	54	24	87	47
AUTUMN											
Kagoshima											
0600	1	5	0	5	6	12	33	63	1	91	56
1800	0	6	0	6	6	13	25	46	2	87	53
Nagasaki											
0600	0	3	0	3	3	10	37	56	7	94	59
1800	0	5	0	5	5	10	25	77	3	93	60
Shimonoseki											
0600	1	8	0	7	9	6	19	56	4	90	38
1800	0	4	0	3	4	4	26	80	3	96	44
Hamada											
0600	0	11	0	11	11	32	21	74	4	76	44
1800	0	8	0	8	8	26	23	62	5	81	50
Kōchi											
0600	1	14	0	14	15	27	32	62	1	78	46
1800	0	7	0	7	7	16	34	25	1	88	57
Ōsaka											
0600	2	6	0	6	8	8	32	32	0	92	47
1800	0	5	0	5	5	5	32	75	4	95	50
Miyazu											
0600	0	15	0	15	15	16	11	34	3	84	27
1800	0	15	0	14	15	19	13	48	6	83	31
Nagoya											
0600	2	9	0	9	12	24	33	74	4	82	50
1800	0	8	0	8	8	20	36	60	17	87	66

*Dust, smoke, haze, fog, precipitation.
#Stratus, nimbus, or cumulonimbus.

(2) *SE type of free air flow.*

The SE type occurs most frequently in summer. It is associated very often with movement of air about the perimeter of a ridge of the Pacific high pressure cell, and occasionally in summer when the ridge is displaced far northward. In spring and fall, southeast air flows commonly occur with the approach of low centers moving eastward from the Yangtze Kiang valley. TABLE V - 4 gives the per cent of observations with various weather conditions at the specified hours 0600 and 1800.

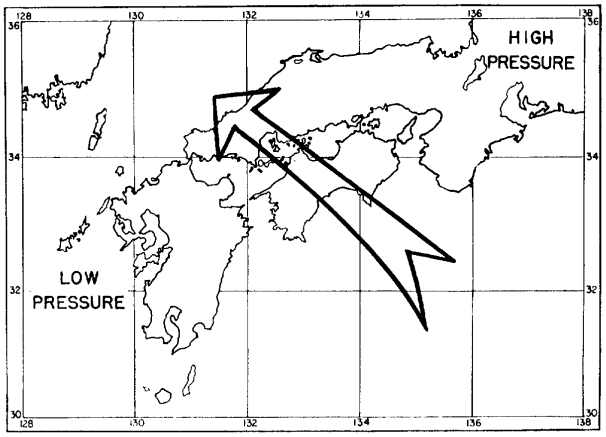


TABLE V - 4.

SUMMARY OF LOCAL WEATHER FOR SE TYPE

	Fog	Pcpn	Thdstm	Ovc with pcpn	Obstruc to vsby*	S, N, or Kn # amts ≥ 0.4	Clds ≤ 0.3 with no obstruc to vsby	Surface winds 3-12 m.p.h. without pcpn	Surface winds > 12 m.p.h. without pcpn	No more than 0.3 S, N, or Kn # clds and no obstruc to vsby	No low clds > 0.5 and no obstruc to vsby
WINTER											
Kagoshima											
0600	0	45	0	40	45	55	10	26	0	45	10
1800	0	38	0	38	38	53	6	19	0	50	13
Nagasaki											
0600	0	45	0	45	45	69	10	15	15	40	25
1800	0	50	0	44	50	69	13	25	0	44	25
Shimonoseki											
0600	0	40	0	40	40	35	5	35	25	60	5
1800	0	19	0	19	19	13	13	44	38	81	19
Hamada											
0600	0	25	0	25	25	39	15	65	5	70	50
1800	0	25	0	25	25	44	13	63	0	75	44
Kōchi											
0600	0	11	0	11	11	30	5	37	0	84	53
1800	0	31	0	31	31	56	13	19	0	69	44
Ōsaka											
0600	0	22	0	22	22	25	11	78	0	78	11
1800	0	45	0	45	45	60	18	36	0	46	18
Miyazu											
0600	0	11	0	11	11	25	0	0	0	78	11
1800	0	46	0	46	46	46	18	18	0	55	18
Nagoya											
0600	0	22	0	22	22	25	11	33	0	78	33
1800	0	55	0	55	55	78	9	18	0	36	18
SPRING											
Kagoshima											
0600	0	36	0	36	36	64	6	36	8	50	25
1800	0	45	0	45	45	70	0	29	7	48	26
Nagasaki											
0600	0	36	0	36	36	57	6	31	8	64	39
1800	0	45	0	45	45	75	7	29	3	48	39
Shimonoseki											
0600	0	22	0	22	22	19	8	31	47	78	25
1800	0	36	0	36	36	37	10	39	26	65	23
Hamada											
0600	0	17	0	17	17	62	11	69	0	78	67
1800	0	29	0	29	29	59	10	42	0	68	48
Kōchi											
0600	0	36	0	36	36	62	9	30	0	55	42
1800	0	36	0	36	36	62	3	13	0	58	36
Ōsaka											
0600	0	27	0	27	27	28	9	62	6	74	27
1800	0	32	0	32	32	35	9	55	5	68	23
Miyazu											
0600	0	29	0	29	29	48	9	12	0	68	35
1800	0	29	0	29	29	36	14	33	5	71	43
Nagoya											
0600	0	41	0	41	41	63	12	29	0	56	29
1800	0	32	0	32	32	47	14	59	0	64	32

	Fog	Pcpn	Thdstm	Ovc with pcpn	Obstruc to vsby*	S, N, or Kn # amts ≥ 0.4	Clds ≤ 0.3 with no obstruc to vsby	Surface winds 3-12 m.p.h. without pcpn	Surface winds > 12 m.p.h. without pcpn	No more than 0.3 S, N, or Kn # clds and no obstruc to vsby	No low clds > 0.5 and no obstruc to vsby
SUMMER											
Kagoshima											
0600	0	25	0	24	25	41	8	48	6	67	31
1800	0	25	0	25	25	55	4	50	6	59	41
Nagasaki											
0600	0	21	0	21	21	44	12	33	13	70	44
1800	0	21	0	21	21	38	12	56	10	75	41
Shimonoseki											
0600	0	13	0	13	13	9	10	28	51	87	27
1800	0	15	0	15	15	10	21	37	47	85	41
Hamada											
0600	0	9	0	9	9	39	21	63	0	82	66
1800	0	12	0	12	12	53	7	52	0	71	52
Kōchi											
0600	4	23	0	23	26	41	6	21	0	69	33
1800	0	22	0	22	22	39	6	25	0	66	27
Ōsaka											
0600	0	20	0	20	20	24	26	51	7	78	46
1800	0	19	0	19	19	21	20	67	6	76	32
Miyazu											
0600	0	15	0	15	15	25	22	15	0	82	38
1800	0	9	0	9	9	19	19	65	2	87	49
Nagoya											
0600	0	16	0	16	16	26	16	36	0	80	40
1800	0	17	0	17	17	36	17	70	13	80	50
AUTUMN											
Kagoshima											
0600	0	29	0	29	29	50	11	38	7	60	36
1800	0	39	0	39	39	68	3	42	6	53	40
Nagasaki											
0600	0	22	0	22	24	46	18	51	9	71	44
1800	0	31	0	31	31	46	11	50	3	67	33
Shimonoseki											
0600	0	29	0	29	29	23	4	44	24	71	20
1800	0	25	0	22	25	22	8	39	31	75	17
Hamada											
0600	0	16	0	16	16	37	18	73	0	76	47
1800	0	19	0	19	19	39	17	47	0	69	42
Kōchi											
0600	0	21	0	21	21	39	21	35	0	69	45
1800	0	29	0	29	29	48	9	17	0	57	23
Ōsaka											
0600	0	26	0	26	26	26	11	65	2	74	17
1800	0	21	0	22	21	24	10	57	10	79	21
Miyazu											
0600	0	22	0	22	24	26	13	11	0	76	35
1800	0	22	0	22	24	29	12	22	2	73	29
Nagoya											
0600	2	30	0	30	33	42	9	20	0	63	24
1800	0	19	0	19	19	32	19	48	0	71	26

*Dust, smoke, haze, fog, precipitation.
#Stratus, nimbus, or cumulonimbus.

(3) *SW type of free air flow.*

This type of air flow occurs principally in spring and summer. In spring it occurs in connection with the prefrontal circulation accompanying pressure troughs which pass over Southwest Japan from the west or northwest. In summer it is associated with a semipermanent circulation on the west side of the Pacific high pressure cell. TABLE V-5 gives the per cent of observations with various weather conditions at 0600 and 1800.

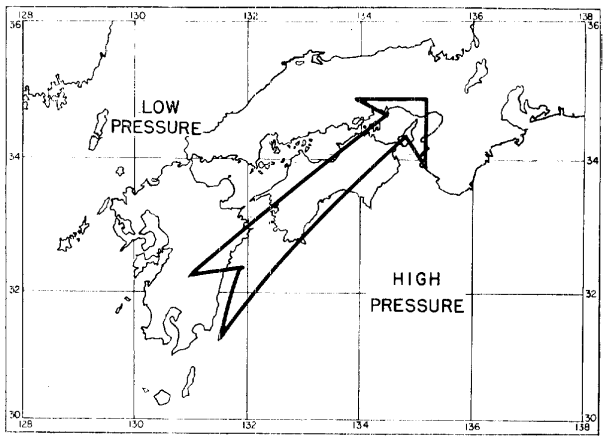


TABLE V-5.

SUMMARY OF LOCAL WEATHER FOR SW TYPE

	Fog	Pcpn	Thdstm	Ovc with pcpn	Obstruc to vsby*	S, N, or Kn # amts ≥ 0.4	Clds ≤ 0.3 with no obstruc to vsby	Surface winds 3-12 m.p.h. without pcpn	Surface winds > 12 m.p.h. without pcpn	No more than 0.3 S, N, or Kn # clds and no obstruc to vsby	No low clds > 0.5 and no obstruc to vsby
WINTER											
Kagoshima											
0600	0	25	0	25	25	53	13	31	0	50	20
1800	0	33	0	33	33	50	7	27	0	60	27
Nagasaki											
0600	0	47	0	47	47	64	6	24	24	47	24
1800	7	21	0	21	29	42	0	36	29	64	14
Shimonoseki											
0600	6	35	0	6	41	35	0	35	18	53	12
1800	0	40	0	40	40	28	7	40	13	60	7
Hamada											
0600	0	29	0	29	29	53	12	35	29	53	24
1800	0	47	0	47	47	54	0	13	20	47	13
Kōchi											
0600	0	20	0	20	20	31	13	40	0	73	27
1800	0	40	0	40	40	50	27	0	0	60	40
Ōsaka											
0600	0	27	0	27	27	33	13	40	0	73	33
1800	0	30	0	30	30	35	10	25	0	70	20
Miyazu											
0600	0	13	0	13	13	13	33	33	27	87	33
1800	0	35	0	35	35	44	15	35	15	65	35
Nagoya											
0600	0	20	0	20	20	31	27	33	0	73	47
1800	0	30	0	30	30	47	10	30	0	65	40
SPRING											
Kagoshima											
0600	0	13	0	13	13	38	17	46	0	74	41
1800	0	11	0	11	11	27	15	58	0	84	53
Nagasaki											
0600	0	13	0	13	13	33	9	44	35	74	30
1800	0	15	0	15	15	45	13	55	22	76	62
Shimonoseki											
0600	2	13	0	13	15	15	20	54	26	83	40
1800	0	11	0	11	13	10	18	49	29	87	42
Hamada											
0600	0	17	0	17	17	54	15	39	35	72	54
1800	0	7	0	7	9	31	13	38	31	82	61
Kōchi											
0600	0	16	0	16	16	48	19	46	3	73	51
1800	0	15	0	15	15	22	7	15	0	85	44
Ōsaka											
0600	0	13	0	13	13	11	27	42	5	87	50
1800	0	18	0	18	18	21	14	57	14	82	38
Miyazu											
0600	0	17	0	17	18	24	22	42	13	82	48
1800	0	19	0	19	19	39	13	57	8	79	58
Nagoya											
0600	5	17	0	15	23	31	18	31	2	72	36
1800	0	20	0	20	23	33	13	51	24	76	47

	Fog	Pcpn	Thdstm	Ovc with pcpn	Obstruc to vsby*	S, N, or Kn # amts ≥ 0.4	Clds ≤ 0.3 with no obstruc to vsby	Surface winds 3-12 m.p.h. without pcpn	Surface winds > 12 m.p.h. without pcpn	No more than 0.3 S, N, or Kn # clds and no obstruc to vsby	No low clds > 0.5 and no obstruc to vsby
SUMMER											
Kagoshima											
0600	0	14	0	14	14	46	7	10	0	66	33
1800	0	11	0	11	11	34	13	64	0	76	43
Nagasaki											
0600	1	22	0	22	23	71	7	39	19	44	27
1800	1	17	0	17	18	45	12	59	23	69	46
Shimonoseki											
0600	1	20	0	18	21	16	10	64	4	79	26
1800	1	16	0	15	17	19	11	65	15	82	31
Hamada											
0600	0	25	0	23	25	55	10	37	13	61	38
1800	0	15	0	14	15	49	13	48	15	71	50
Kōchi											
0600	10	18	0	18	28	53	14	8	0	60	41
1800	0	18	0	18	18	44	10	21	0	67	40
Ōsaka											
0600	1	7	0	7	8	8	19	22	1	92	32
1800	1	7	0	7	9	11	11	69	18	92	40
Miyazu											
0600	1	9	0	9	10	16	25	34	5	88	46
1800	0	13	0	12	13	21	14	57	2	85	44
Nagoya											
0600	1	12	0	11	13	23	17	38	2	80	34
1800	1	16	0	16	16	37	14	59	16	75	48
AUTUMN											
Kagoshima											
0600	0	0	0	0	0	33	10	70	0	80	56
1800	0	23	0	15	23	30	0	31	0	77	31
Nagasaki											
0600	0	10	0	10	10	56	10	60	20	50	20
1800	0	39	0	39	39	67	0	15	31	54	39
Shimonoseki											
0600	0	20	0	20	20	22	20	60	10	80	30
1800	0	31	0	31	31	23	8	39	23	69	8
Hamada											
0600	0	40	0	40	40	50	10	50	0	60	30
1800	0	8	0	8	8	70	15	31	8	46	39
Kōchi											
0600	0	50	0	50	50	57	25	25	0	50	38
1800	0	15	0	15	15	50	8	8	0	54	15
Ōsaka											
0600	0	21	0	21	21	33	5	25	0	74	26
1800	0	8	0	8	8	9	19	35	12	92	35
Miyazu											
0600	0	16	0	16	16	27	16	42	21	79	37
1800	0	17	0	17	17	24	17	48	0	83	39
Nagoya											
0600	5	5	0	5	11	31	21	37	5	73	42
1800	0	15	0	15	15	23	23	62	8	77	42

*Dust, smoke, haze, fog, precipitation.
#Stratus, nimbus, or cumulonimbus.

(4) NW type of free air flow.

This type of air flow is associated in winter with the seasonal circulation of eastern Asia described under NE type of air flow. It is almost always associated with the movement of a low center up the east coast of Honshū. Fresh and only slightly modified polar air accompanies this flow. TABLE V - 6 gives the per cent of observations with various weather conditions at 0600 and 1800.

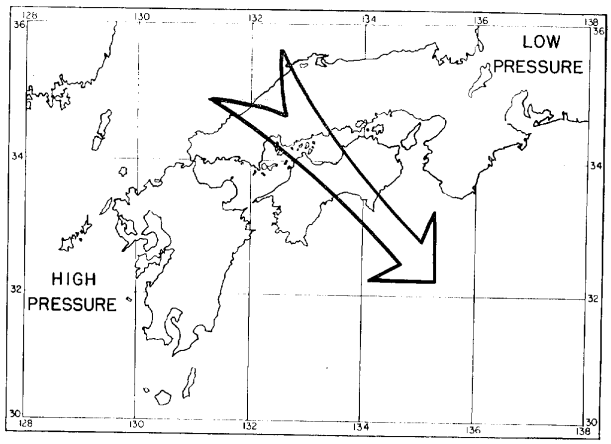


TABLE V - 6.

SUMMARY OF LOCAL WEATHER FOR NW TYPE

	Fog	Pcpn	Thdstm	Ovc with pcpn	Obstruc to vsby*	S, N, or Kn ※ amts ≧4	Cldns ≦3 with no obstruc to vsby	Surface winds 3-12 m.p.h. without pcpn	Surface winds > 12 m.p.h. without pcpn	No more than 0.3 S, N, or Kn ※ clds and no obstruc to vsby	No low clds > 0.5 and no obstruc to vsby
WINTER											
Kagoshima											
0600	0	17	0	11	17	25	14	42	1	75	28
1800	0	11	0	5	11	25	15	58	11	78	32
Nagasaki											
0600	0	24	0	23	25	32	10	37	23	70	19
1800	0	18	0	16	18	20	11	45	34	76	15
Shimonoseki											
0600	0	16	0	16	16	17	7	20	60	81	11
1800	0	12	0	11	12	16	8	32	55	82	19
Hamada											
0600	0	36	0	34	36	63	6	32	29	37	8
1800	0	27	0	27	27	62	4	30	41	38	12
Kōchi											
0600	0	5	0	2	5	5	48	41	0	95	67
1800	0	1	0	1	1	3	40	61	2	92	68
Ōsaka											
0600	0	2	0	2	2	2	38	54	24	98	47
1800	0	2	0	2	2	4	40	45	42	95	44
Miyazu											
0600	0	45	0	42	45	50	4	24	4	51	15
1800	0	48	0	44	48	52	13	37	0	48	16
Nagoya											
0600	1	7	0	6	8	10	40	68	5	91	49
1800	1	6	0	5	7	11	41	67	21	91	52
SPRING											
Kagoshima											
0600	0	0	0	0	0	9	32	51	3	95	73
1800	0	2	0	0	2	16	31	86	10	91	64
Nagasaki											
0600	0	3	0	3	3	13	22	49	16	89	43
1800	0	5	0	5	5	7	24	41	52	95	48
Shimonoseki											
0600	0	8	0	8	8	6	22	38	54	92	43
1800	0	7	0	7	7	5	17	50	43	93	31
Hamada											
0600	0	19	0	19	22	42	16	35	38	60	28
1800	0	10	0	10	10	33	14	38	43	71	29
Kōchi											
0600	7	4	0	4	11	10	50	50	0	89	68
1800	0	7	0	7	7	11	43	60	0	91	62
Ōsaka											
0600	0	3	0	3	3	4	44	41	16	97	58
1800	0	5	0	3	5	0	34	53	26	95	40
Miyazu											
0600	0	21	0	18	21	24	27	33	6	79	39
1800	0	43	0	41	43	50	19	41	3	54	27
Nagoya											
0600	0	9	0	6	9	14	58	55	18	91	76
1800	0	0	0	0	0	7	32	24	76	95	49

	Fog	Pcpn	Thdstm	Ovc with pcpn	Obstruc to vsby*	S, N, or Kn ※ amts ≧4	Cldns ≦3 with no obstruc to vsby	Surface winds 3-12 m.p.h. without pcpn	Surface winds < 12 m.p.h. without pcpn	No more than 0.3 S, N, or Kn ※ clds and no obstruc to vsby	No low clds > 0.5 and no obstruc to vsby
SUMMER											
Kagoshima											
0600	0	9	0	9	9	20	27	9	0	82	36
1800	0	13	0	13	13	33	25	69	6	88	75
Nagasaki											
0600	0	9	0	9	9	29	36	46	0	82	64
1800	0	6	0	6	6	14	44	81	6	94	75
Shimonoseki											
0600	0	0	0	0	0	0	0	91	9	100	9
1800	0	0	0	0	0	0	19	69	31	100	63
Hamada											
0600	0	18	0	18	18	60	18	55	27	45	27
1800	0	0	0	0	0	25	25	69	25	88	63
Kōchi											
0600	0	0	0	0	0	0	44	44	0	100	88
1800	0	13	0	6	13	50	38	25	0	75	75
Ōsaka											
0600	5	5	0	5	9	0	18	41	0	91	50
1800	0	5	0	5	5	7	32	90	0	95	45
Miyazu											
0600	0	9	0	9	9	16	23	5	0	86	41
1800	0	0	0	0	0	0	11	95	0	100	47
Nagoya											
0600	5	5	0	5	9	14	32	55	0	91	64
1800	0	5	0	5	5	11	25	50	45	95	80
AUTUMN											
Kagoshima											
0600	0	10	0	5	10	19	29	39	0	76	39
1800	0	7	0	7	7	11	41	55	2	84	49
Nagasaki											
0600	0	17	0	15	17	24	7	39	17	78	17
1800	0	9	0	9	9	20	16	67	18	82	27
Shimonoseki											
0600	0	22	0	20	22	15	12	27	51	78	20
1800	0	7	0	7	7	7	13	49	44	93	27
Hamada											
0600	0	27	0	24	27	42	5	32	37	56	7
1800	0	11	0	11	11	32	16	47	33	69	31
Kōchi											
0600	0	7	0	4	7	5	26	52	0	93	52
1800	0	4	0	4	4	6	40	47	0	93	62
Ōsaka											
0600	2	5	0	2	7	5	25	41	18	93	39
1800	0	7	0	5	7	2	36	61	25	93	46
Miyazu											
0600	0	28	0	23	28	38	21	35	5	67	40
1800	0	24	0	18	24	24	24	59	3	77	29
Nagoya											
0600	7	9	0	9	18	25	21	52	5	75	34
1800	0	2	0	2	7	9	30	73	14	89	57

*Dust, smoke, haze, fog, precipitation.
※Stratus, nimbus, or cumulonimbus.

(5) *N type of free air flow.*

The N type of flow like the NW and NE types is associated in winter with the winter monsoon circulation of eastern Asia, and represents the transition between the other northerly types. North air flow persists when extratropical cyclones pass over or south of Southwest Japan. The per cent of observations with various weather conditions is shown in TABLE V - 7.

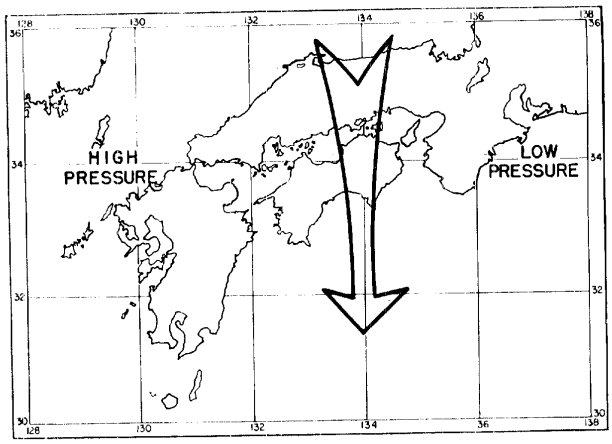


TABLE V - 7.

SUMMARY OF LOCAL WEATHER FOR N TYPE

	Fog	Pcpn	Thdstm	Ovc with pcpn	Obstruc to vsby*	S, N, or Kn # amts ≥ 4	Clds ≤ 0.3 with no obstruc to vsby	Surface winds 3-12 m.p.h. without pcpn	Surface winds > 12 m.p.h. without pcpn	No more than 0.3 S, N, or Kn # clds and no obstruc to vsby	No low clds > 0.5 and no obstruc to vsby
WINTER											
Kagoshima											
0600	0	7	0	4	7	19	27	56	1	83	33
1800	0	2	0	2	2	11	24	74	8	91	43
Nagasaki											
0600	1	12	0	12	15	23	16	55	19	67	32
1800	0	15	0	15	17	14	60	22	29	83	31
Shimonoseki											
0600	0	12	0	12	12	8	16	37	44	85	23
1800	0	14	0	14	14	3	11	48	35	86	22
Hamada											
0600	0	30	0	30	30	57	10	43	23	45	12
1800	0	26	0	26	26	52	2	49	22	49	11
Kōchi											
0600	0	0	0	0	0	5	38	52	0	96	52
1800	0	1	0	1	1	3	40	61	2	98	64
Ōsaka											
0600	0	3	0	2	3	3	40	44	22	97	44
1800	0	5	0	2	5	4	29	59	30	95	31
Miyazu											
0600	0	56	0	54	56	64	0	19	5	37	2
1800	0	63	0	58	63	74	2	22	2	27	5
Nagoya											
0600	0	2	0	2	2	2	35	76	10	98	51
1800	0	6	0	6	6	8	42	51	41	92	57
SPRING											
Kagoshima											
0600	4	15	0	15	19	25	35	42	8	77	46
1800	0	4	0	4	4	6	30	82	7	96	70
Nagasaki											
0600	0	8	0	8	8	21	23	50	15	81	35
1800	0	4	0	4	4	6	26	67	26	96	63
Shimonoseki											
0600	0	8	0	8	8	4	19	54	27	92	35
1800	0	7	0	7	7	5	26	78	15	93	48
Hamada											
0600	0	42	0	42	42	65	8	42	8	42	19
1800	0	7	0	7	7	56	11	56	22	63	41
Kōchi											
0600	5	14	0	9	18	24	27	46	0	82	50
1800	0	4	0	4	4	11	30	74	4	93	67
Ōsaka											
0600	0	7	0	7	7	8	48	52	15	93	52
1800	0	4	0	4	4	4	19	62	27	96	35
Miyazu											
0600	0	41	0	37	41	54	15	15	11	44	15
1800	0	60	0	56	60	58	8	20	16	36	8
Nagoya											
0600	0	0	0	0	0	10	78	37	52	96	70
1800	0	4	0	0	4	0	23	27	69	96	58

	Fog	Pcpn	Thdstm	Ovc with pcpn	Obstruc to vsby*	S, N, or Kn # amts ≥ 4	Clds ≤ 0.3 with no obstruc to vsby	Surface winds 3-12 m.p.h. without pcpn	Surface winds > 12 m.p.h. without pcpn	No more than 0.3 S, N, or Kn # clds and no obstruc to vsby	No low clds > 0.5 and no obstruc to vsby
SUMMER											
Kagoshima											
0600	0	25	0	25	25	33	25	0	0	75	50
1800	0	33	0	33	33	60	17	67	0	50	17
Nagasaki											
0600	0	0	0	0	0	0	0	75	0	100	50
1800	0	0	0	0	0	0	17	100	0	100	67
Shimonoseki											
0600	0	0	0	0	0	0	0	100	0	100	0
1800	0	0	0	0	0	0	17	83	17	100	33
Hamada											
0600	0	25	0	25	25	67	0	75	0	50	25
1800	0	0	0	0	0	0	0	83	17	100	67
Kōchi											
0600	0	0	0	0	0	0	25	25	0	100	50
1800	0	0	0	0	0	25	0	33	0	83	33
Ōsaka											
0600	0	0	0	0	0	0	40	80	0	100	80
1800	0	0	0	0	0	0	0	80	0	100	0
Miyazu											
0600	0	0	0	0	0	0	20	0	0	100	60
1800	0	0	0	0	0	0	0	100	0	100	20
Nagoya											
0600	0	0	0	0	0	0	0	60	0	100	60
1800	0	0	0	0	0	33	12	82	3	100	60
AUTUMN											
Kagoshima											
0600	0	4	0	4	4	17	32	56	0	84	60
1800	0	0	0	0	0	6	32	61	0	97	68
Nagasaki											
0600	0	8	0	8	8	9	28	68	0	92	40
1800	0	0	0	0	0	5	13	74	7	97	52
Shimonoseki											
0600	0	16	0	16	16	8	12	48	12	84	16
1800	0	7	0	7	7	4	16	84	10	94	26
Hamada											
0600	0	12	0	12	12	29	4	72	12	72	80
1800	0	16	0	13	16	21	26	55	13	81	36
Kōchi											
0600	0	0	0	0	0	0	24	59	0	100	47
1800	0	3	0	3	3	5	42	29	8	97	68
Ōsaka											
0600	0	0	0	0	0	0	35	39	8	100	46
1800	0	0	0	0	0	0	32	90	5	100	50
Miyazu											
0600	0	27	0	23	27	29	12	39	0	73	35
1800	0	23	0	18	23	24	14	50	5	77	23
Nagoya											
0600	0	4	0	4	4	5	23	65	4	96	39
1800	0	8	0	8	8	10	42	50	33	92	54

*Dust, smoke, haze, fog, precipitation.
#Stratus, nimbus, cumulonimbus.

(6) Ridge or high type.

Ridges and high centers over Kyūshū, Shikoku, and southwestern Honshū occur from 14% to 20% of the time throughout the various seasons of the year. It was not considered feasible in this study to break down high centers and ridges according to air mass, but it should be obvious that in summer these centers are usually connected with the Pacific high pressure cell, and are composed of maritime tropical air; in winter they often yield modified polar continental air. The per cent of observations with various weather conditions at the specified hours, 0600 and 1800 is given in TABLE V - 8.

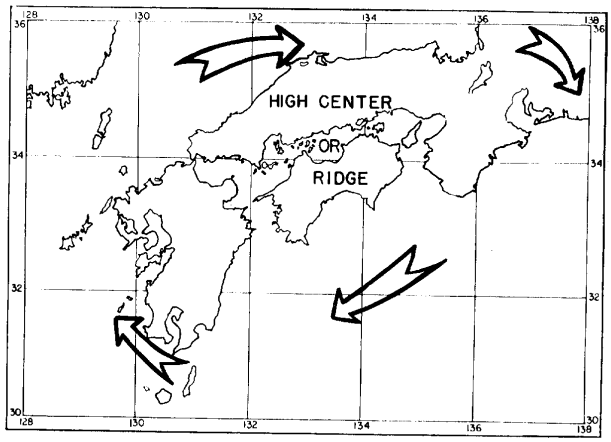


TABLE V - 8.

SUMMARY OF LOCAL WEATHER FOR RIDGE AND *HIGH* TYPE

	Fog	Pcpn	Thdstm	Ovc with pcpn	Obstruc to vsby*	S, N, or Kn✻ amts ≥ 0.4	Clds ≤ 0.3 with no obstruc to vsby	Surface winds 3-12 m.p.h. without pcpn	Surface winds > 12 m.p.h. without pcpn	No more than 0.3 S, N, or Kn✻ clds and no obstruc to vsby	No low clds > 0.5 and no obstruc to vsby
WINTER											
Kagoshima											
0600	0	2	0	2	2	9	47	67	0	92	59
1800	0	0	0	0	0	7	42	44	0	95	61
Nagasaki											
0600	0	6	0	6	6	12	32	37	5	91	54
1800	0	3	0	3	3	7	21	67	3	95	48
Shimonoseki											
0600	0	3	0	3	3	3	25	68	14	97	34
1800	0	5	0	5	5	4	32	75	10	95	39
Hamada											
0600	0	8	0	8	8	18	29	71	14	88	52
1800	0	10	0	10	10	32	24	63	10	73	44
Kōchi											
0600	0	5	0	5	5	7	56	72	2	95	71
1800	0	3	0	3	3	5	58	25	0	97	80
Ōsaka											
0600	1	4	0	4	5	4	48	41	2	84	62
1800	0	2	0	2	2	2	39	44	0	98	41
Miyazu											
0600	1	8	0	6	9	20	18	18	5	81	26
1800	0	6	0	6	6	11	21	47	2	89	36
Nagoya											
0600	0	1	0	1	1	2	46	59	0	99	63
1800	0	2	0	2	2	5	54	56	11	94	69
SPRING											
Kagoshima											
0600	0	3	0	3	3	13	31	56	0	94	67
1800	0	8	0	8	8	19	28	70	5	92	77
Nagasaki											
0600	0	3	0	3	3	8	38	37	9	96	73
1800	0	4	0	4	4	9	38	78	4	95	84
Shimonoseki											
0600	3	4	0	4	9	3	30	59	23	90	48
1800	0	3	0	3	3	3	38	72	16	96	74
Hamada											
0600	0	3	0	3	3	11	40	75	9	93	77
1800	0	3	0	1	3	15	42	58	8	10	82
Kōchi											
0600	0	3	0	3	3	7	44	58	0	97	84
1800	0	4	0	4	5	8	27	20	0	93	58
Ōsaka											
0600	1	0	0	0	1	0	45	56	0	99	74
1800	0	0	0	2	2	3	41	76	2	98	76
Miyazu											
0600	2	2	0	2	3	8	38	18	1	95	62
1800	0	2	0	2	2	3	36	49	2	98	78
Nagoya											
0600	3	0	0	0	3	6	48	45	1	94	76
1800	0	2	0	2	2	7	42	48	32	97	81

	Fog	Pcpn	Thdstm	Ovc with pcpn	Obstruc to vsby*	S, N, or Kn✻ amts ≥ 0.4	Clds ≤ 0.3 with no obstruc to vsby	Surface winds 3-12 m.p.h. without pcpn	Surface winds > 12 m.p.h. without pcpn	No more than 0.3 S, N, or Kn✻ clds and no obstruc to vsby	No low clds > 0.5 and no obstruc to vsby
SUMMER											
Kagoshima											
0600	1	5	0	5	6	14	26	34	0	92	69
1800	0	8	0	6	8	29	25	69	2	81	58
Nagasaki											
0600	0	5	0	5	5	27	20	37	3	87	71
1800	0	6	0	6	6	17	21	85	2	92	67
Shimonoseki											
0600	1	2	0	2	3	3	26	54	17	97	45
1800	0	4	0	4	4	3	29	65	27	96	56
Hamada											
0600	0	1	0	1	1	25	34	73	4	92	81
1800	0	8	0	6	8	11	25	65	4	90	60
Kōchi											
0600	1	3	0	3	4	5	35	28	0	96	84
1800	0	4	0	4	6	9	19	15	0	80	56
Ōsaka											
0600	0	2	0	2	2	3	37	35	0	98	69
1800	0	0	0	0	0	4	6	85	12	97	28
Miyazu											
0600	0	1	0	1	1	2	37	20	0	99	63
1800	0	6	0	6	6	12	15	58	0	91	64
Nagoya											
0600	3	5	0	5	9	16	28	36	1	89	65
1800	0	0	0	0	0	33	12	82	3	88	70
AUTUMN											
Kagoshima											
0600	0	5	0	5	7	13	34	67	0	92	65
1800	0	21	0	21	21	35	21	33	0	73	46
Nagasaki											
0600	0	7	0	7	7	18	30	27	4	89	53
1800	0	6	0	6	6	21	37	48	0	89	73
Shimonoseki											
0600	0	5	0	5	5	1	19	60	9	95	31
1800	0	0	0	0	0	0	23	73	8	100	37
Hamada											
0600	0	2	0	2	2	20	33	86	4	88	68
1800	0	0	0	0	0	18	31	50	8	89	54
Kōchi											
0600	0	2	0	2	2	3	32	79	0	95	63
1800	0	8	0	8	8	18	29	10	0	88	65
Ōsaka											
0600	2	3	0	3	5	2	37	49	0	95	54
1800	0	11	0	11	11	11	28	55	0	89	42
Miyazu											
0600	3	4	0	4	7	8	16	16	0	93	43
1800	0	9	0	9	9	11	24	55	0	91	44
Nagoya											
0600	7	4	0	4	11	17	32	57	1	84	56
1800	0	11	0	11	15	15	29	59	0	83	42

*Dust, smoke, haze, fog, precipitation.
✻Stratus, nimbus, or cumulonimbus.

52. *Weather and Operations*

A. Ground operations.

The weather factors which affect combat activities, supply, mobility, and comfort of troops on the ground are precipitation, temperature, wind speed, and humidity.

(1) *Precipitation.*

The trafficability of local soils and unimproved roads is determined largely by the amount and intensity of precipitation. The extent and type of storage facilities, the type of clothing and the comfort of the troops are also dependent upon the frequency and amount of rain or snow.

The total annual amounts of precipitation over Kyūshū, Shikoku, and southwestern Honshū vary between 50 and 190 inches, with the greater part of the area experiencing between 60 and 80 inches. The highest annual amounts occur over the mountains of central Shikoku and north of Ise-wan (bay) with approximately 120 inches, and over the mountains of the Kii-hantō (peninsula) with 120 to 190 inches. The lowest annual amounts occur over the Seto-naikai (Inland Sea) region with approximately 50 inches annually. The monthly distribution reflects the effects of topography. Stations south of the principal range of mountains which form the backbone of Honshū record a minimum of precipitation in the winter months, with 1½ to 3 inches common in January, and a maximum in the summer months, with 8 to 12 inches common in June. November through March are the months with light rains, and April through October the months with moderate to heavy rains. A general decrease of rainfall occurs in August, and in some years drought conditions are experienced. September is a month of very heavy rains, which, in a few localities fully exposed to south and southeast winds, amount to the maximum monthly rainfall for the year. The heavy September rainfall is caused not only by an increase in cyclonic activity, but also, in part, by torrential rains accompanying the passage of typhoons.

A somewhat different distribution of rainfall is noted along the northern coasts and northward-facing slopes of southwestern Honshū. The maximum monthly precipitation occurs in September with a secondary maximum in January. Moderate amounts are recorded in all months of the year without the marked contrast between months which features the rainfall regime of the south coast stations. Snowfall is more common over the northern region, particularly over the higher slopes of the mountains. Snowfall is occasionally recorded along the south coasts, but does not stay on the ground for any appreciable period of time (FIGURE V - 10).

The number of days with rainfall in the southern sections varies between 8 and 12 days per month during winter, and 14 and 18 days per month in summer. In the Seto-naikai (Inland Sea) region the number of rainy days per month reaches a maximum of 12 to 14 days during the 2 rainiest months, June and September, and varies between 8 and 10 days for the other months of the year. Along the north coast of southwestern Honshū, the least number of rainy days occurs in August with 11, and the greatest number in December and January with 21 to 25 days (FIGURE V - 11).

The heaviest single falls of rain are to be expected whenever a typhoon moves inland over the Japanese mainland. At Hiroshima nearly 30 inches has fallen within 24 hours in such a storm. This amount is exceptional; 8 to 12 inches within 24 hours typifies a more reasonable expectancy for maximum precipitation within the area.

The annual amounts of rainfall by hours is shown for the Kōbe station in FIGURE V - 9. The heaviest amounts occur in the early morning hours and the least amounts in the early afternoon. This distribution is very well marked in the month of September. In the winter months of January and February there is a tendency for the greatest amounts to occur in the early afternoon, and the least amounts shortly after midnight. FIGURES V - 10 and V - 11 indicate the average precipitation in inches and the average number of days with precipitation for the area of Kyūshū, Shikoku, and southwestern Honshū. The number of reporting stations in the coastal areas is far greater than the number in the mountainous interior and, therefore, the charts are more accurate for the coastal areas than for interior areas.

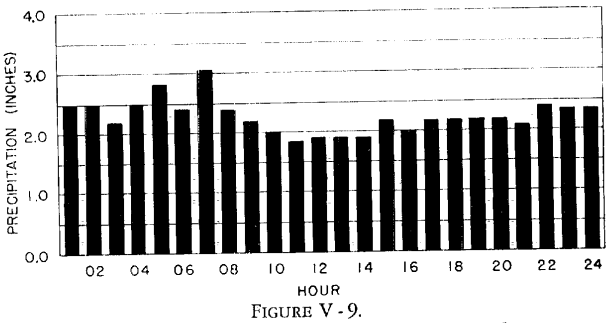
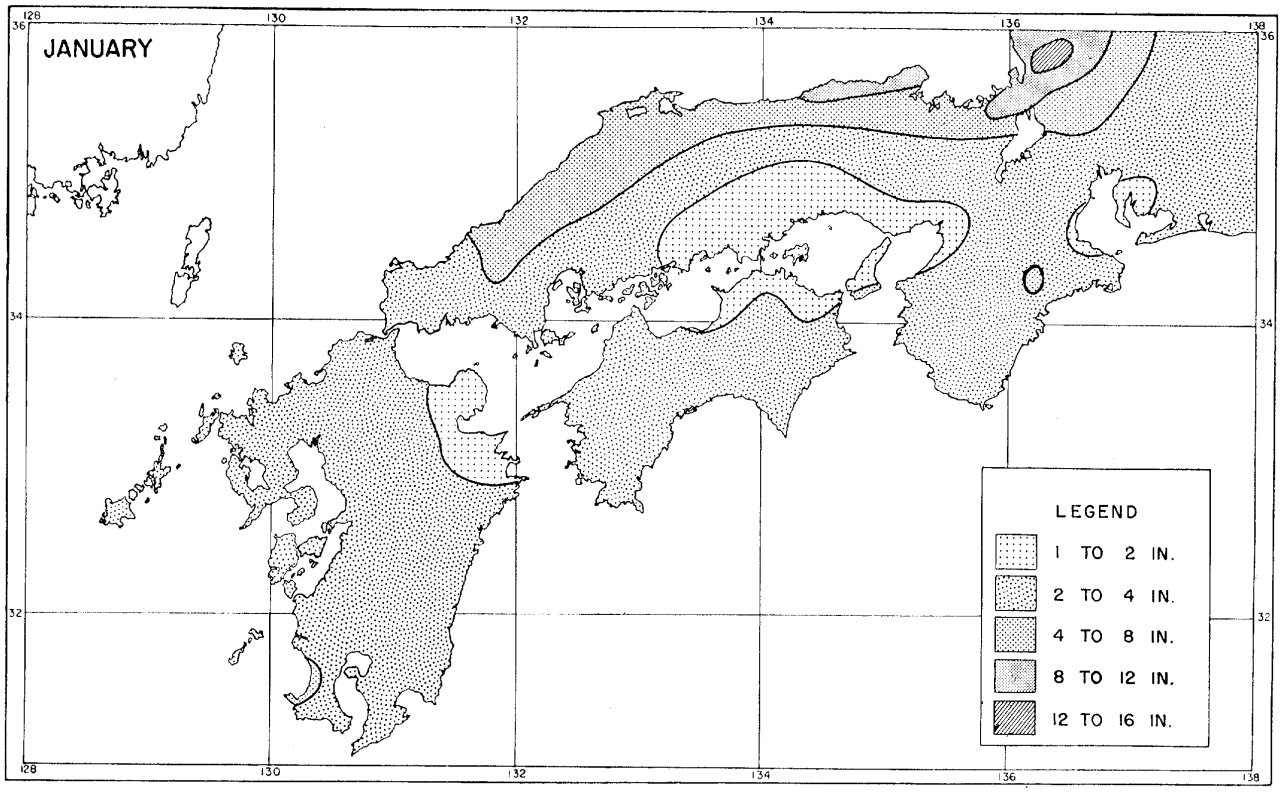


FIGURE V - 9.
Average Annual Precipitation by Hours for Kōbe.

(2) *Temperature.*

Temperature affects the comfort of the troops and the comparative perishability of foodstuffs and other supplies.

The temperature regime of Southwest Japan is characterized by mild winters and warm summers. Temperatures are not excessively high or excessively low at any time of the year, but the high temperatures coupled with the high humidity of summer make for sultry conditions which are trying for people from more temperate climates. This is particularly true of the Seto-naikai (Inland Sea) region, where high temperatures, high humidity, and very light surface winds combine to give that region an unfavorable reputation. Temperatures rarely go above 100° F. anywhere in the region, but maximum temperatures in the high 80s or low 90s are quite frequent in midsummer. Temperatures in the interior are likely to be higher than coastal temperatures in midsummer. Temperatures in winter are modified greatly by the adjacent ocean areas. The warm Kuroshio flows a short distance off the southern shores and a branch of the Kuroshio flows northward through the Tsushima-kaikyō (straits) and thence northeastward along the northern shores of southern Honshū. With all shores of the region adjacent to warm ocean currents, the mean January minimum temperature does not fall below freezing at any point along the coasts, and 13° F. is the extreme minimum temperature recorded. The mean maximum and mean minimum temperatures for January and July are shown in FIGURES V - 12 and V - 13. It should be



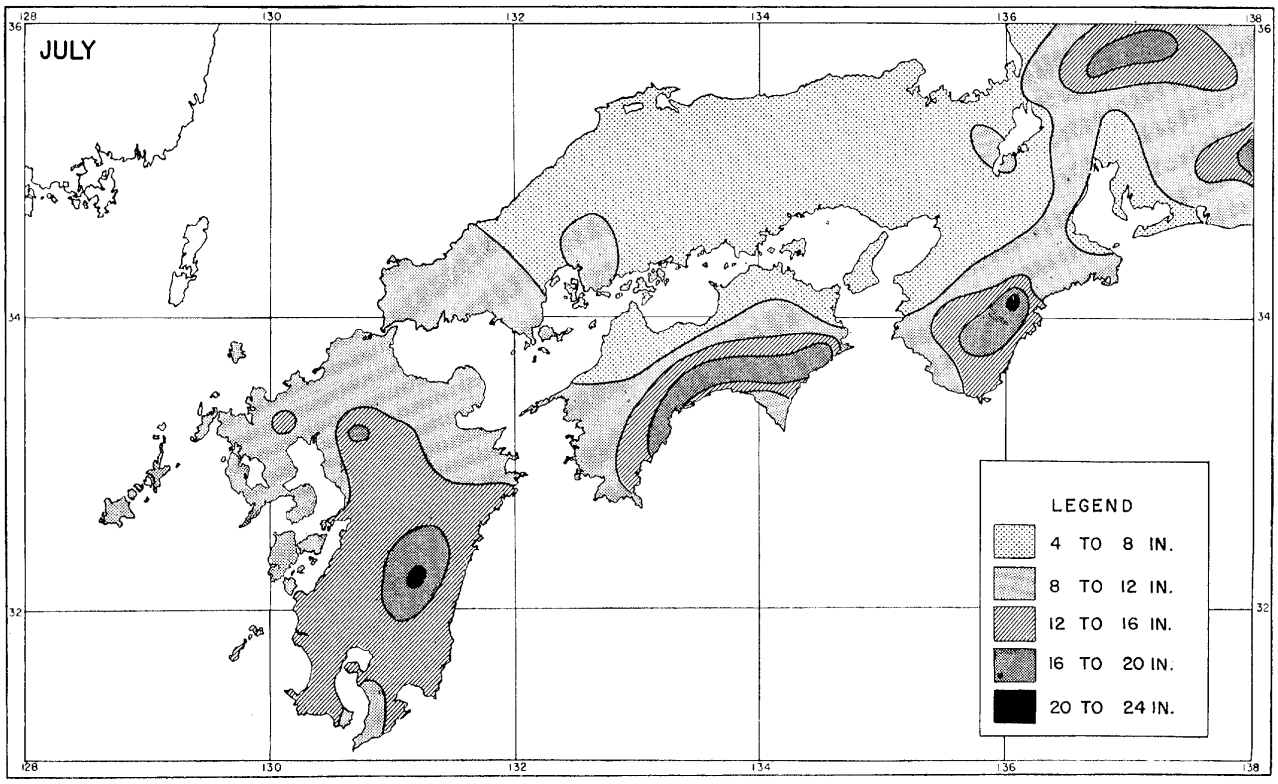


FIGURE V - 10.
Average Precipitation for January and July.

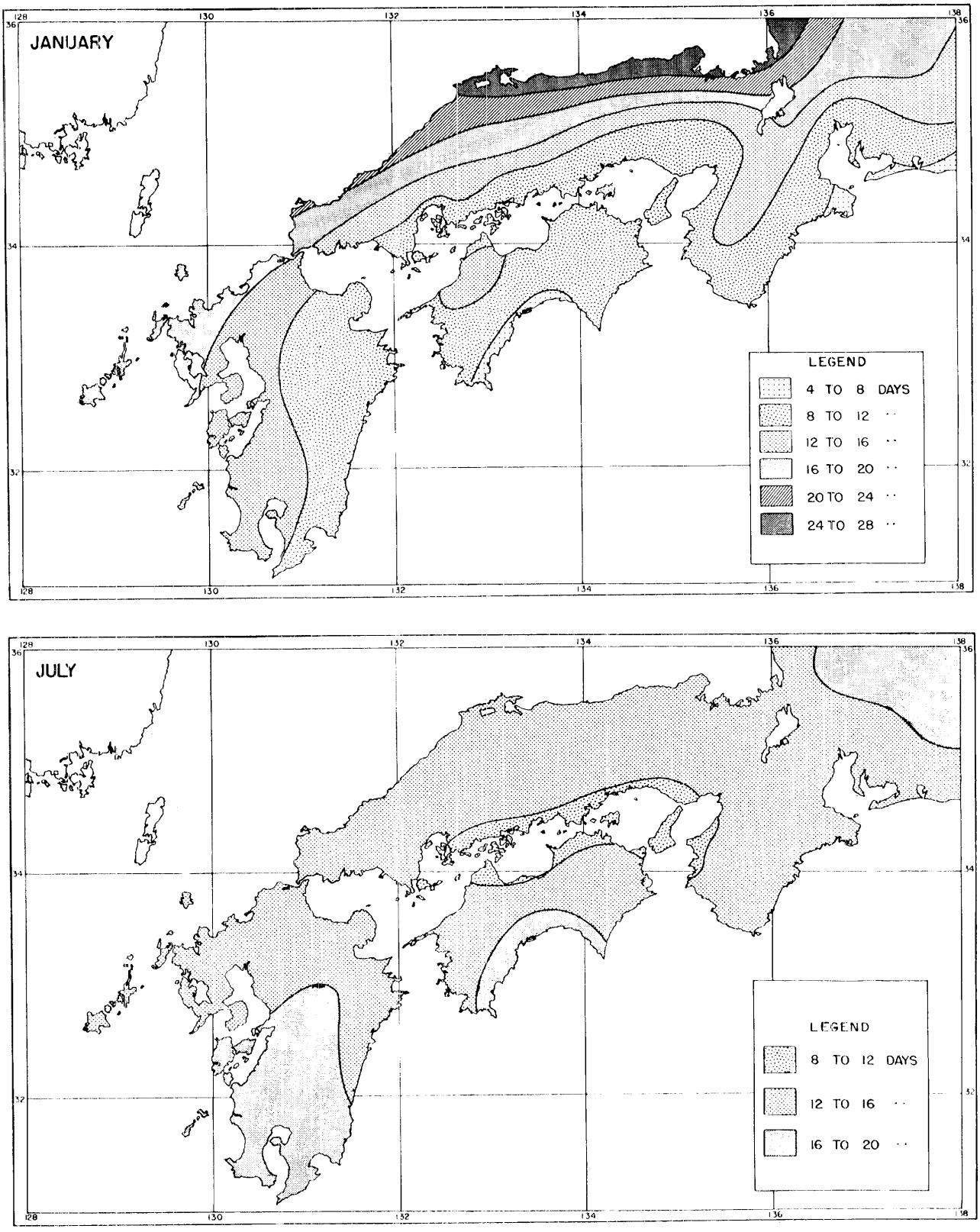
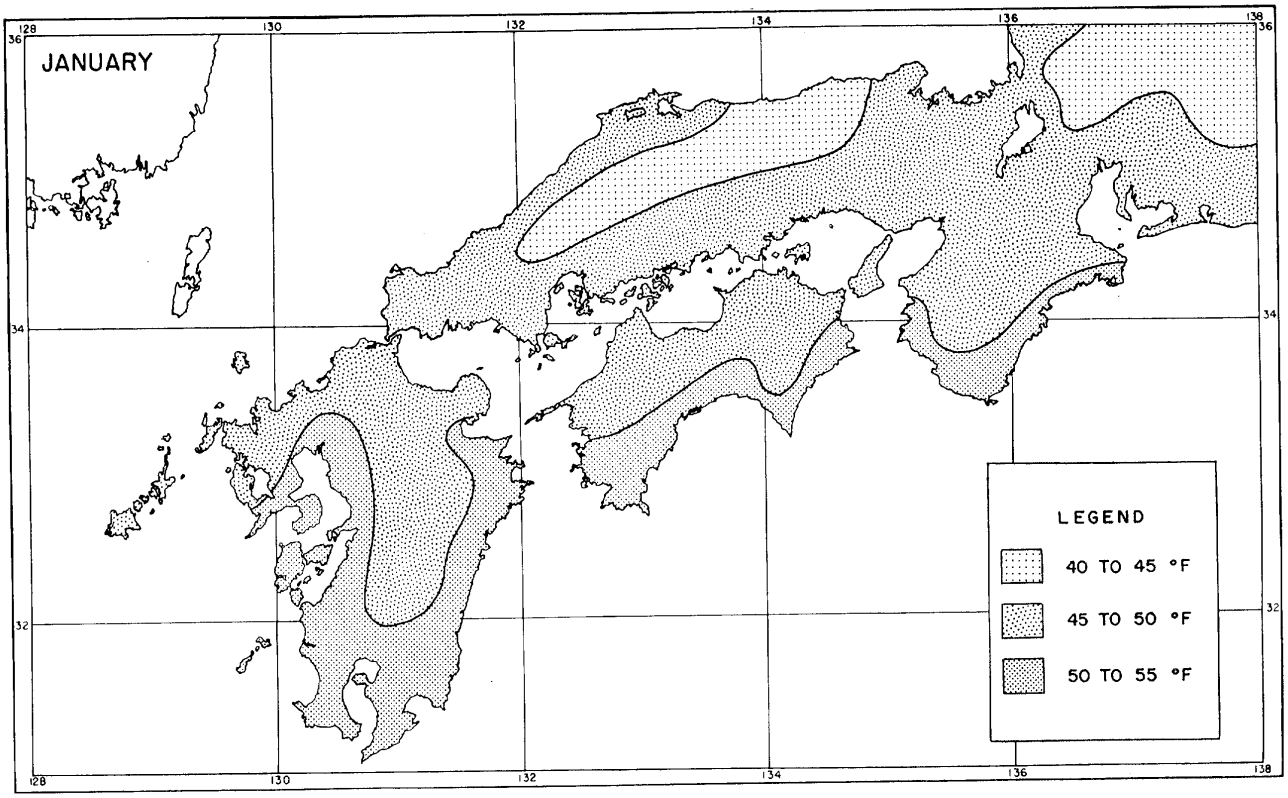


FIGURE V - 11.
Average Number of Days with Precipitation for January and July.



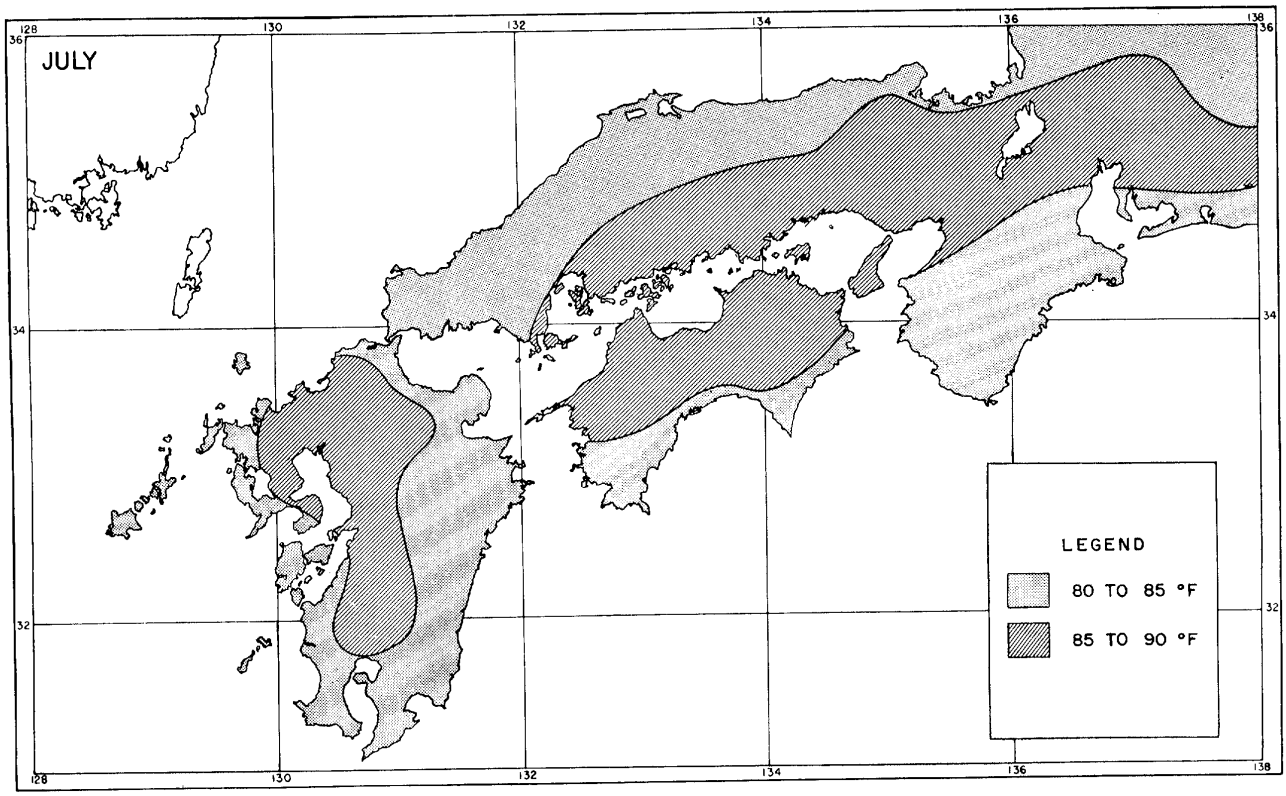
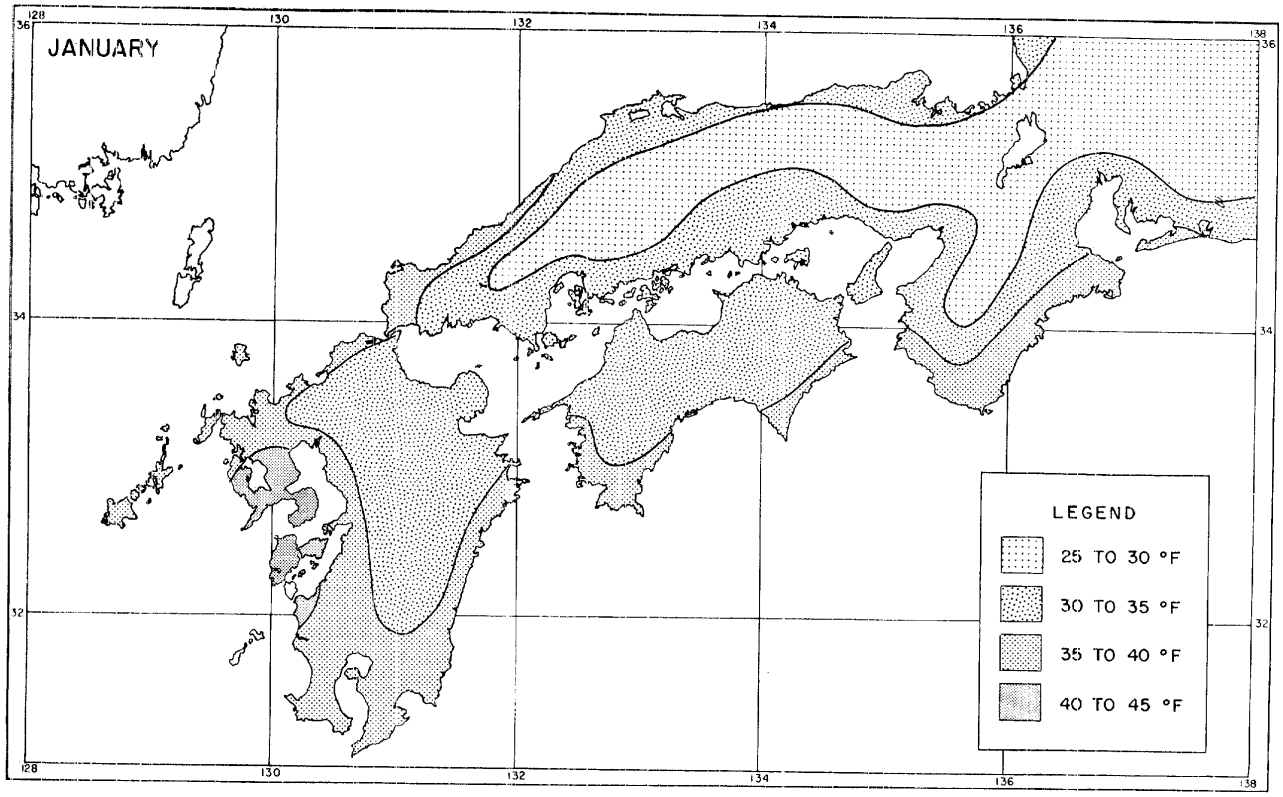


FIGURE V - 12.
Mean Daily Maximum Temperatures for January and July.



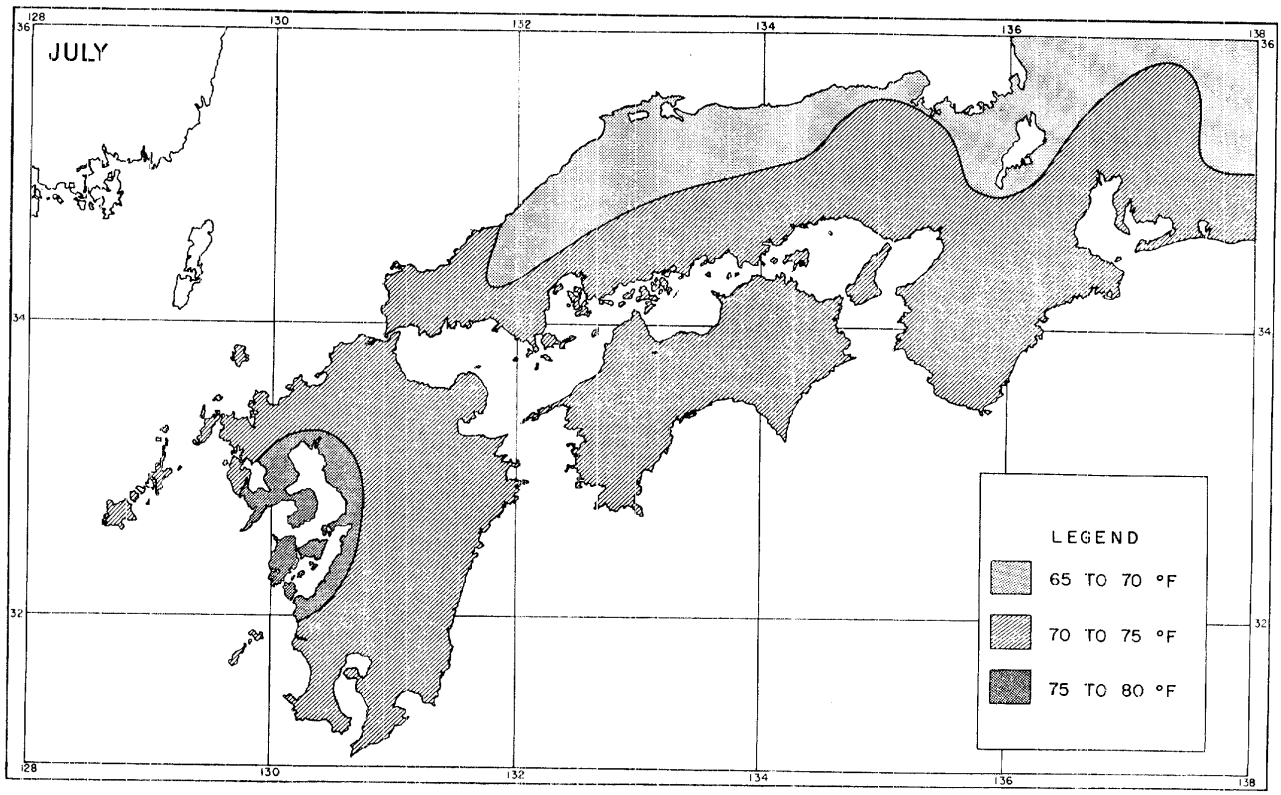


FIGURE V - 13.
Mean Daily Minimum Temperatures for January and July.

stressed that these charts were developed from data for low-level stations only and that temperatures for high mountain localities probably will exceed the limits given.

(3) Humidity.

Humidity enters into the relative comfort of the troops and into the type of packaging necessary to conserve certain foodstuffs and other supplies. Radio equipment is peculiarly susceptible to deterioration in very humid climates. The rusting of metal materials and the molding of leather and other organic products because of persistent high humidities constitute special problems.

The diurnal regime of temperature at Kōbe, shown in FIGURE V - 14, attains a maximum between 1400 and 1500 and a minimum betwen 0400 and 0500.

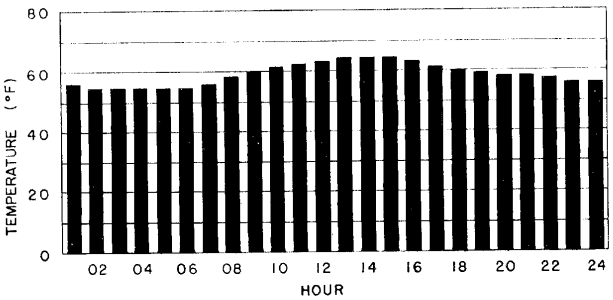


FIGURE V - 14.
Average Annual Temperature by Hours for Kōbe.

The humidity of all coastal sections is moderately high at all seasons of the year, averaging about 70% for the months with the lowest humidities. Observatories located a short distance inland record slightly lower values of relative humidity. In summer the relative humidity at exposed coastal stations, such as Kōchi or Hamamatsu, becomes very high, averaging 85% in July. Along the northern coast of southwestern Honshū, the relative humidity is nearly as high in midwinter as in the midsummer months. But the absolute humidity is lower, and the moist atmosphere is more easily endured because of the lower temperatures of the winter season.

(4) Synoptic conditions favorable for ground operations.

During the winter, when the N or NW type of air flow prevails, conditions are unfavorable for ground operations along the northern coasts of Kyūshū and southwestern Honshū, because these windward coasts receive a maximum or a secondary maximum of rain and snow during the winter monsoon. Furthermore, the temperature remains near freezing during the winter monsoon along these coasts, resulting in poor trafficability caused by alternate freezing and thawing. On the other hand, the lee side of the main islands has conditions more favorable for ground operations during the prevalence of the N and the NW types, since during such periods they receive very scanty precipitation, and the warming effects of the downslope motion of the air plus the effect of a high percentage of sunshine keeps the temperature above freezing most of the time during the winter monsoon. Even in southern Kyūshū, Shikoku, and Honshū, however, midwinter freezing detracts from the advantage arising from scanty precipitation, so that the most favorable conditions will occur during early and late winter when the northerly flow occurs.

The situation during the summer (May through September) is unfavorable throughout this area because of excessive precipitation, but is more favorable in northern Kyūshū and the Sanindō district of Honshū than in the southerly- or easterly-facing portions of these islands when the air flow is from the southeast or south. When the flow is of the SW type, there is no favorable place, although the northeast side of Kyūshū is better than any other section of the region. During the occasional protracted periods of northwesterly or northerly flow during August and September, very favorable conditions occur on the southern slopes and shores and in the Seto-naikai (Inland Sea) district. The favorableness of the situation during any type of flow depends, then, on the persistence of the flow, topography, temperature, and humidity. The best conditions occur on lee slopes when circulation is strong and temperatures well above freezing.

B. Air operations.

(1) Topography in relation to flying conditions.

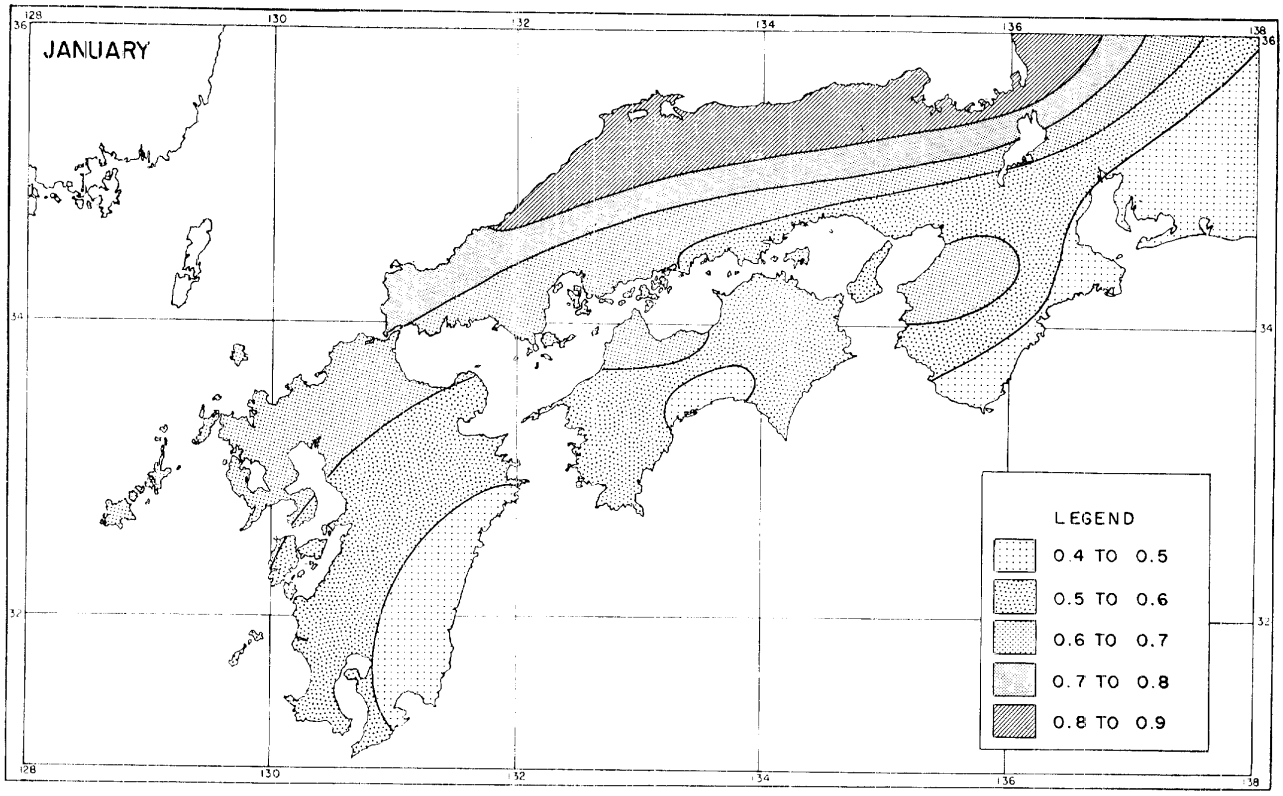
The topography of a given region exerts a twofold effect upon the air navigability of that region: first, it determines the altitude at which aircraft are required to operate; and second, it causes large and important local variations in weather. The icing hazard over mountain chains is much more serious than over level terrain, particularly where frontal zones are forced across the mountains. The incidence of low ceilings and high wind speeds increases over the mountains and the effects of turbulence are experienced at higher levels above the mountains.

The highest mountains of Japan are found in the region between Toyama-wan, arm of the Japan Sea, and Suruga-wan and the Sagami-nada, arms of the Pacific Ocean along the south coast of Japan. The northeast corner of the area considered in this report is within the high mountain section, with one peak, Ontake-san, attaining a height of 10,447 feet. The mountain ranges which lie east - west in southwestern Honshū and in Shikoku and in a general north - south direction in Kyūshū and the Kii-hantō have individual peaks rising to elevations of 6,000 to 7,500 feet. The backbone of Honshū Island consists of a range which is a very important climatological boundary, separating the regions facing the Japan Sea from those facing the Pacific Ocean.

Along the northern coast the winters are characterized by almost continuous broken-to-overcast low cloud cover and very frequent light snows or rains, while the southern coasts experience a large number of days with fine weather. In summer the differences between the 2 regions is not so well marked.

(2) Low-level bombing operations.

(a) Cloudiness and low ceilings. In the southern sections of the area, the average cloudiness shows a decided maximum in June and a secondary maximum in September. The minimum of cloudiness occurs in the late fall and winter from November through February. This minimum of cloudiness is shown not only in the mean cloudiness data but also is reflected in the large number of clear days in those months. The maximum of cloudi-



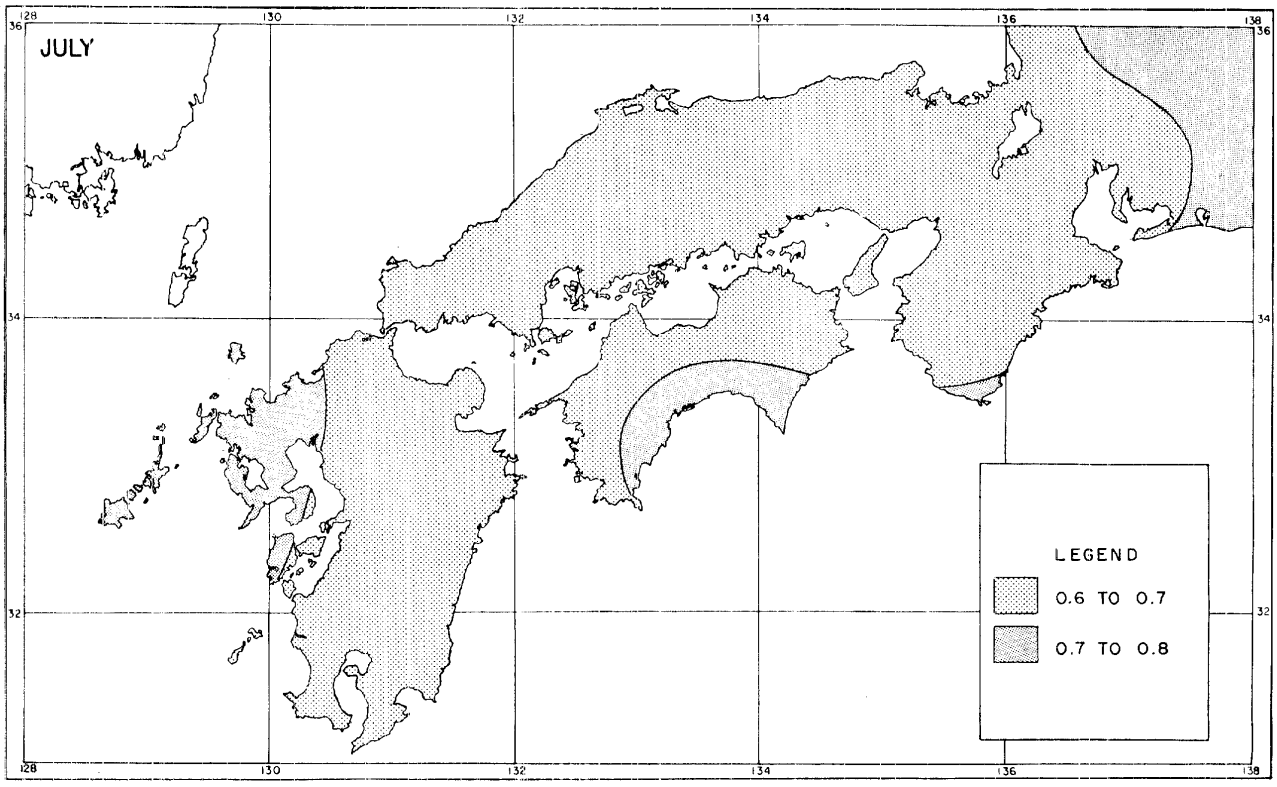


FIGURE V - 15.
Mean Cloudiness for January and July (scale 0.0-1.0)

TABLE V - 9.
AVERAGE CLOUDINESS BY 5-DAY PERIODS

	JUNE						JULY					
	31-4	5-9	10-14	15-19	20-24	25-29	30-4	5-9	10-14	15-19	20-24	25-29
Hiroshima	6.6	7.0	7.7	7.9	8.0	8.3	7.9	8.1	7.1	7.1	6.5	6.0
Ōsaka	6.2	7.2	7.5	7.5	7.8	8.0	7.6	7.3	6.7	6.8	5.9	5.6
Kōchi	7.3	7.6	8.3	8.5	8.5	8.6	8.2	8.5	7.6	7.8	7.3	6.5

ness in June may be broken down further to show a 5-day maximum at the peak of the "Bai-U" season. Illustrative data for Hiroshima, Ōsaka, and Kōchi are given in TABLE V - 9. The peak of the cloudiness is seen to occur in the last 5-day period of June. A similar increase of the early summer cloudiness occurs along the northern coast, but over this latter section the maximum monthly cloudiness occurs in January and February. This winter cloudiness is not associated with storm or frontal movement, but is formed in the cold air streams which cross the Japan Sea from Siberia to the Japanese islands (FIGURE V - 15).

The diurnal course of cloudiness at Kōbe as shown in FIGURE V - 16 attains a maximum between 1200 and 1400 and a minimum between 2100 and 2300 L.C.T. The afternoon maximum is somewhat more pronounced in summer than at other seasons of the year.

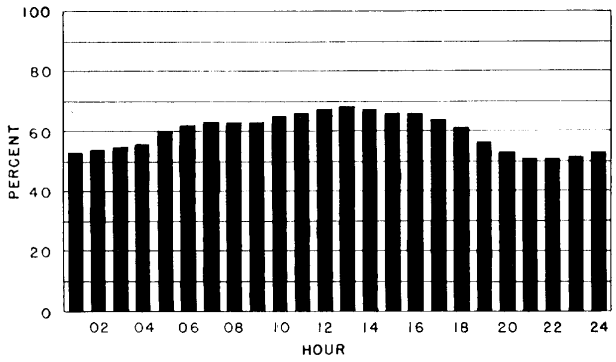


FIGURE V - 16.
Average Annual Cloudiness by Hours for Kōbe.

Unfortunately, ceiling data are not available for Japanese stations. In their absence the incidence of low type clouds, stratus, nimbus and cumulonimbus, is given in TABLES V - 38 to V-40. The lowest ceilings may be expected over the southern coastal regions in the summer months, particularly during the "Bai-U" season. Over the northern coastal regions low clouds are most frequent during the winter months.

(*b*) *Fog and visibility.* Over the area as a whole, fog is not an important meteorological element, occurring only a few days each year. Certain localities, where air drainage is poor, are more subject to foggy weather. Such conditions prevail in Kyōto where an average of 49 days with fog per year is recorded. The fogs are most frequent during the cooler months of the year from October through March and are probably of radiation type, forming in the very early morning hours and usually dissipating before noon. Kumamoto and Ituhara on Kyūshū Island average 17 to 21 days with fog, with a maximum occurrence in the summer months. Sumoto on Shikoku Island with 42 days and Ōsaka on Honshū with 13 days, on the other hand, have their maximum occurrence of fog in the winter months. The distribution of fog in these regions is similar to that at Kyōto. FIGURE V - 17 showing fog during January and July was drawn from data for low-level stations only. It does not reflect the fogginess of the high mountain districts or of the high inland valleys.

Direct data on the occurrence of visibility limits are not available for Japanese stations. However, certain obstructions to visibility such as fog, haze, smoke, and precipitation, are given in the Japanese reports, and they have been summarized in the flow-type tables. It is probable that all instances of low visibility occurrences are included in these data.

(*c*) *Target weather conditions.* Whether or not low-level bombing operations are feasible depends upon conditions at the point of departure, the conditions enroute, and the conditions over the target. This discussion presents only the conditions over Southwest Japan and gives no indication of the number of days when it is feasible to operate to the area from bases outside. TABLE V - 10 shows the average number of days per month with conditions suitable for low-level bombing.

(*d*) *Icing conditions.* The mean level of the freezing isotherm in the area ranges in winter from 1,000 to 2,000 feet over southwestern Honshū, 2,500 to 5,500 feet in southern Kyūshū. During the spring months the mean level rises from 3,000 feet in March to 9,000 feet in May in the north, and from 6,500 feet in March to 10,500 feet in May in the far south. In summer the height ranges from 11,500 feet to 14,000 feet over the whole area, while in fall it varies from about 12,500 feet in September to 5,500 feet in November in the north and from 13,000 feet in September to 8,000 feet in November in southern Kyūshū. The following table gives the mean approximate freezing levels by months for the northern and southern extremities of the area included in this report. The height of the freezing isotherm is not obtained from actual soundings, but by extrapolation from mean surface temperatures using a lapse rate of 0.6° C. for each 100 meters elevation.

In the summer months most of the icing would be confined to the tops of cumulonimbus or swelling cumulus clouds. During other seasons icing would be moderate or severe in clouds during frontal passages. Special mention should be made of the regular presence during winter months of thick cumuliform clouds and snow or rain showers along the northwest

APPROXIMATE MEAN LEVEL OF THE 32° F. (0° C.) ISOTHERM
OVER SOUTHWESTERN JAPAN, IN FEET.

Direction	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Far North	1100	1100	3300	6600	9300	11500	13600	14200	12600	8700	5500	2200
Far South	2700	3300	6600	8700	10400	12600	14200	14200	13100	10800	8200	5500

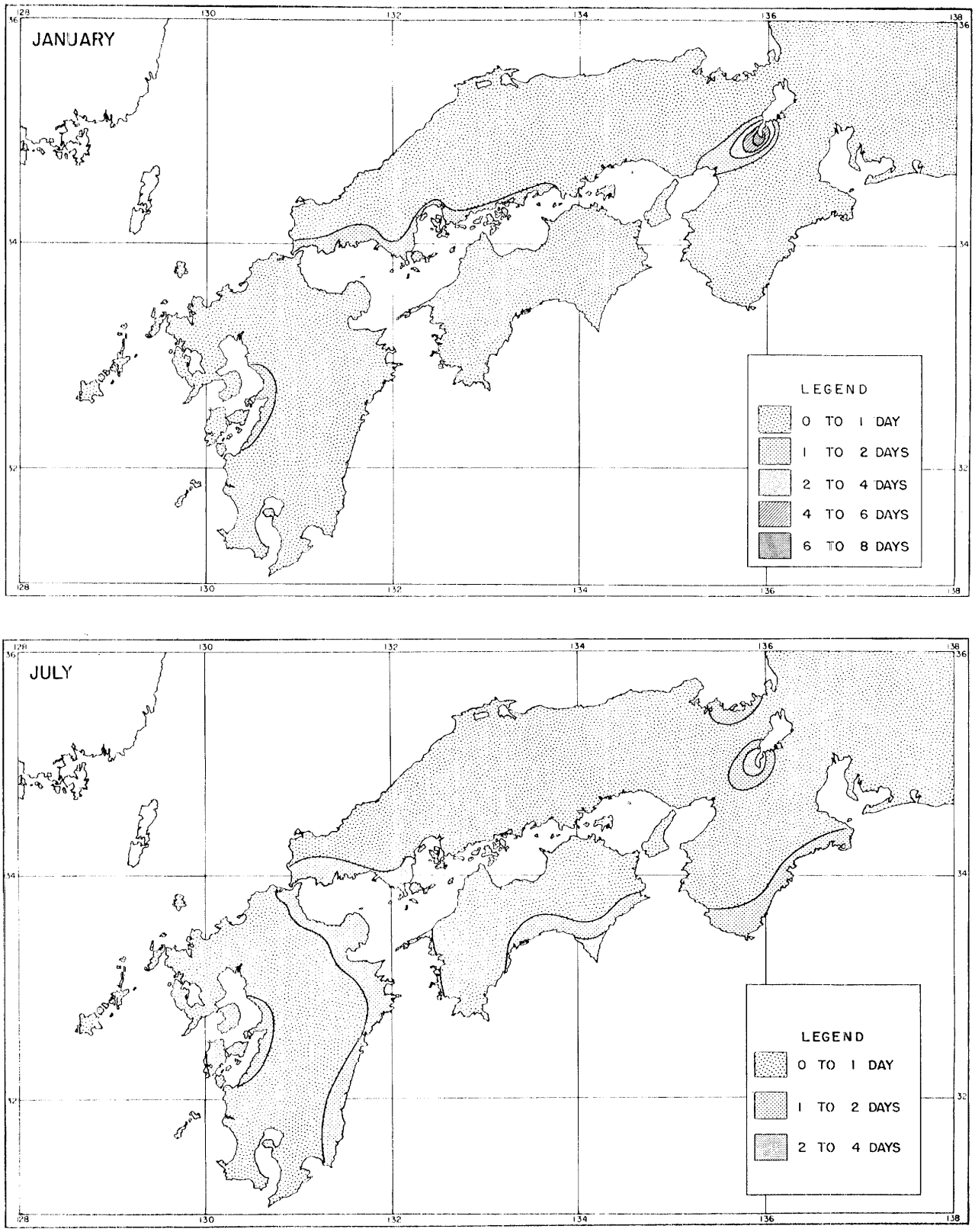


FIGURE V - 17.
Average Number of Days with Fog for January and July

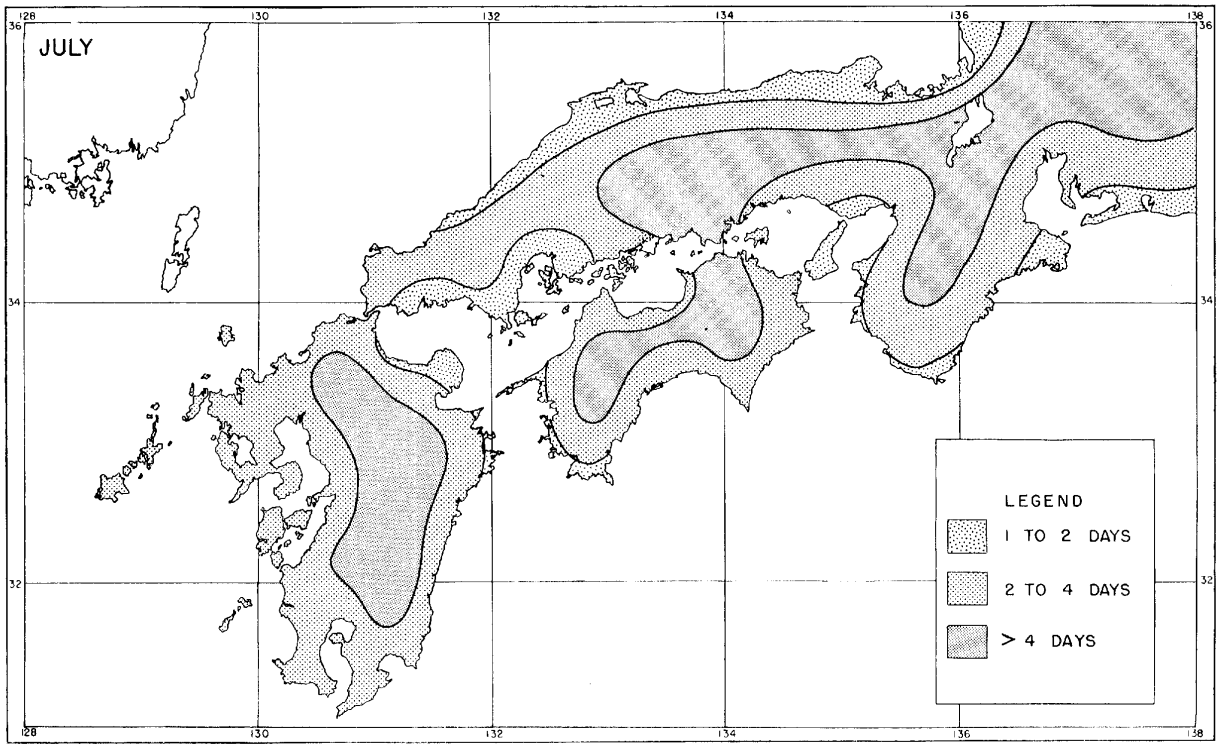


FIGURE V - 18.
Average Number of Days with Thunderstorms for July.

TABLE V - 10.
AVERAGE NUMBER OF DAYS WITH CONDITIONS SUITABLE FOR LOW-LEVEL BOMBING#

STATIONS	DEC	JAN	FEB	WINTER	MAR	APR	MAY	SPRING	JUN	JUL	AUG	SUMMER	SEP	OCT	NOV	AUTUMN
0600 L.C.T.																
Kagoshima	11	11	8	30	13	14	17	44	11	13	14	38	15	15	14	44
Nagasaki	12	12	15	39	14	16	19	49	15	12	15	42	17	18	13	48
Fukuoka	9	9	6	24	14	15	17	46	14	13	15	42	15	15	11	41
Shimonoseki	8	7	6	21	10	12	12	34	9	10	10	29	9	9	7	25
Ōita	15	16	13	44	16	18	19	53	16	14	15	45	12	16	15	43
Hiroshima	14	11	10	35	15	14	17	46	14	11	13	38	11	15	14	40
Hamada	9	8	7	24	13	16	19	48	16	15	16	47	14	15	11	40
Shimizu	5	3	2	10	3	3	4	10	3	2	5	10	8	9	4	21
Kōchi	13	19	18	50	16	15	16	47	12	15	13	40	9	9	10	28
Tokushima	13	14	12	39	11	13	18	42	14	13	13	40	10	10	11	31
Shiono-misaki	11	10	12	33	13	12	15	40	12	11	12	35	12	11	12	35
Kōbe	12	14	10	36	16	15	19	50	14	10	14	38	12	14	15	41
Ōsaka	15	14	12	41	12	14	15	41	14	11	17	42	10	14	11	35
Kyōto	9	12	9	30	10	15	14	39	14	10	12	36	10	13	11	34
Miyazu	6	4	3	13	10	13	12	35	14	11	12	37	11	12	8	31
Nagoya	16	16	12	44	20	16	16	52	14	10	17	41	12	12	12	36
Hamamatsu	20	19	18	57	18	16	11	45	12	12	16	40	11	14	19	44
1800 L.C.T.																
Kagoshima	13	12	12	37	16	15	19	50	11	14	15	40	13	17	14	44
Nagasaki	11	10	11	32	17	17	20	54	16	14	18	48	14	18	13	45
Fukuoka	11	8	9	28	14	16	16	46	13	12	14	39	13	17	11	41
Shimonoseki	8	7	8	23	11	14	14	39	12	11	13	36	10	12	6	28
Ōita	15	14	15	44	16	18	19	53	15	14	15	44	12	15	15	42
Hiroshima	11	10	12	33	16	15	17	48	13	14	14	41	11	13	15	39
Hamada	9	7	7	23	14	13	19	46	17	14	15	46	13	15	11	39
Shimizu	7	2	3	12	4	3	4	11	3	3	6	12	9	8	7	24
Kōchi	18	19	16	53	17	15	15	47	13	12	11	36	11	17	18	46
Tokushima	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Shiono-misaki	11	15	12	38	13	12	15	40	12	11	12	35	12	11	12	35
Kōbe	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Ōsaka	16	12	9	37	13	13	14	40	10	12	13	35	11	14	13	38
Kyōto	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Miyazu	7	4	4	15	9	14	15	38	15	12	14	41	9	10	8	27
Nagoya	17	17	14	48	16	15	17	48	14	13	17	44	12	16	16	44
Hamamatsu	20	22	19	61	18	16	18	52	15	12	18	45	12	16	19	47

Suitable conditions: Cloudiness less than 65% when low clouds are predominant, no obstructions to visibility, and no pronounced frontal activity.

coast of Japan exposed to the Japan Sea. Icing in these clouds is sometimes severe.

Swelling cumulus occur in winter just off the coasts where the northerly winds move from the cold, dry land onto the warm, moist, ocean surface. These clouds may be within sight of land or even right on the coast, and have temperatures favorable for icing throughout.

(e) *Turbulence.* Non-frontal turbulence over the Japanese islands may be associated with thunderstorms, may occur in cold air flowing over relatively warm surfaces, or may be mechanically induced over mountainous terrain. Thunderstorm activity is not great over Southwest Japan and is confined largely to the summer months. From July through September an average of 3 to 4 thunderstorms occur each month (FIGURE V - 18). It is possible that thunderstorms are more frequent over interior mountain regions from which reports were not available.

The lower layers of the cold air approaching Honshū across the Japan Sea are unstable. As this cold air is forced to rise over the mountainous coast line, the turbulence factor is greatly increased. This fact, together with the occurrence of low clouds, precipitation, and the probability of icing, makes the west and north coastal regions of Japan relatively unsafe for low-level bombing during the winter months.

Frontal turbulence is associated with the passage of fronts and may be especially severe where the frontal zones pass over the high mountains of central Japan. It is essential that information regarding all fronts in the vicinity be received from the weather officer before any flight is taken over the Japanese area.

(f) *Surface winds.* In a country as rugged as Japan, infinite variations in the frequency and intensity of local winds are to be expected. Only in exceptional instances will the local winds accord with the general air flow in both speed and direction. Examples may be seen in the wind direction frequency tables (TABLE V - 33). At Kagoshima the prevailing wind is from the northwest during all months of the year. If the adjacent directions are considered, from August through March 50% to 80% of the observed winds are from the northeast-north-northwest quadrant, and from May through July 35% to 50% of all observed winds are from the north-northwest-west quadrant.

The contrast between the persistence of the northwesterly winds in winter and the variability of the winds in midsummer is quite striking. At Nagasaki northerly winds prevail from September through April and southwesterly winds, from May through August, but wind direction is more variable there than at Kagoshima. Also wind speeds are stronger at Nagasaki than at Kagoshima, particularly in the winter months. The effects of topography are evident in the records for Fukuoka and Shimonoseki where southeast and east winds, respectively, are prevalent. The percentage of easterly winds at Shimonoseki is great, particularly in the warm months of the year, but at Fukuoka the percentage of southeasterly winds is rather small at all seasons of the year. In the protected localities of Kōbe, Osaka and Kyōto, the surface winds are quite variable at all seasons of the year and the mean wind velocities are relatively low.

Where the prevailing air flow is in the same direction as the topographic trends, the persistency of the air flow is increased, as at Kagoshima in winter; but where the local influences are in a different direction from the prevailing air flow, the persistency of the air flow is weakened or is altogether lacking, as at Kyōto and at Shimonoseki. Local land and sea breeze effects do occur, especially in the summer season, but they are difficult to evaluate because of other complicating factors.

The annual wind velocity by hours at Kōbe is shown in FIGURE V - 19. The strongest winds occur in the afternoon and the weakest winds in the early morning. This diurnal difference persists throughout the year, but is more marked in summer than in midwinter.

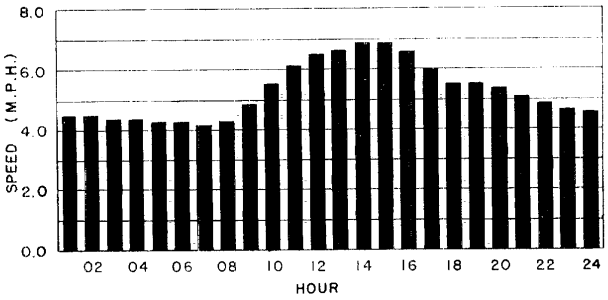


FIGURE V - 19.
Average Annual Wind Speed by Hours for Kōbe.

Mean wind velocities vary between 5 and 10 m.p.h., the stronger winds occurring in the winter months and at exposed stations, and the weaker winds occurring in the summer months and at sheltered stations. Maximum velocities may occur at any time of year with winds from any direction, but they are most likely to occur in September in connection with typhoons and are most likely to come from the south or south-southeast. The distribution of maximum wind speeds by months and by wind directions for all reporting stations is as follows:

NUMBER OF STATIONS REPORTING MAXIMUM WIND SPEEDS IN EACH MONTH

JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
2	6	6	8	6	5	4	14	39	7	2	7

NUMBER OF STATIONS REPORTING MAXIMUM WIND SPEEDS FROM GIVEN DIRECTIONS

N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW
9	5	6	2	3	4	7	17	12	7	5	4	7	4	5	6

The extreme wind speed recorded at a low-level station in Japan, 111 m.p.h., occurred at Kagoshima during a typhoon. The extreme wind speed recorded at a mountain station in Japan, 161 m.p.h., occurred at Tukubasan, also during a typhoon.

(g) *Winds aloft.* Wind roses at selected levels are shown in FIGURES V - 20 to V - 25 for 5 stations in Southwest Japan. The data from which these wind roses were constructed represent fair weather conditions only; that is, all instances of precipitation and nearly all instances of low cloudiness are excluded. However, they do represent the wind conditions for those days on which flying is most practicable. The air flow winds at the surface are quite shallow over Japan in both summer and winter. Surface winds are replaced by quite variable winds at relatively low levels and by the prevailing westerlies at higher levels. Mean wind speeds are not excessively high at any of the levels shown in the wind-rose charts. Maximum

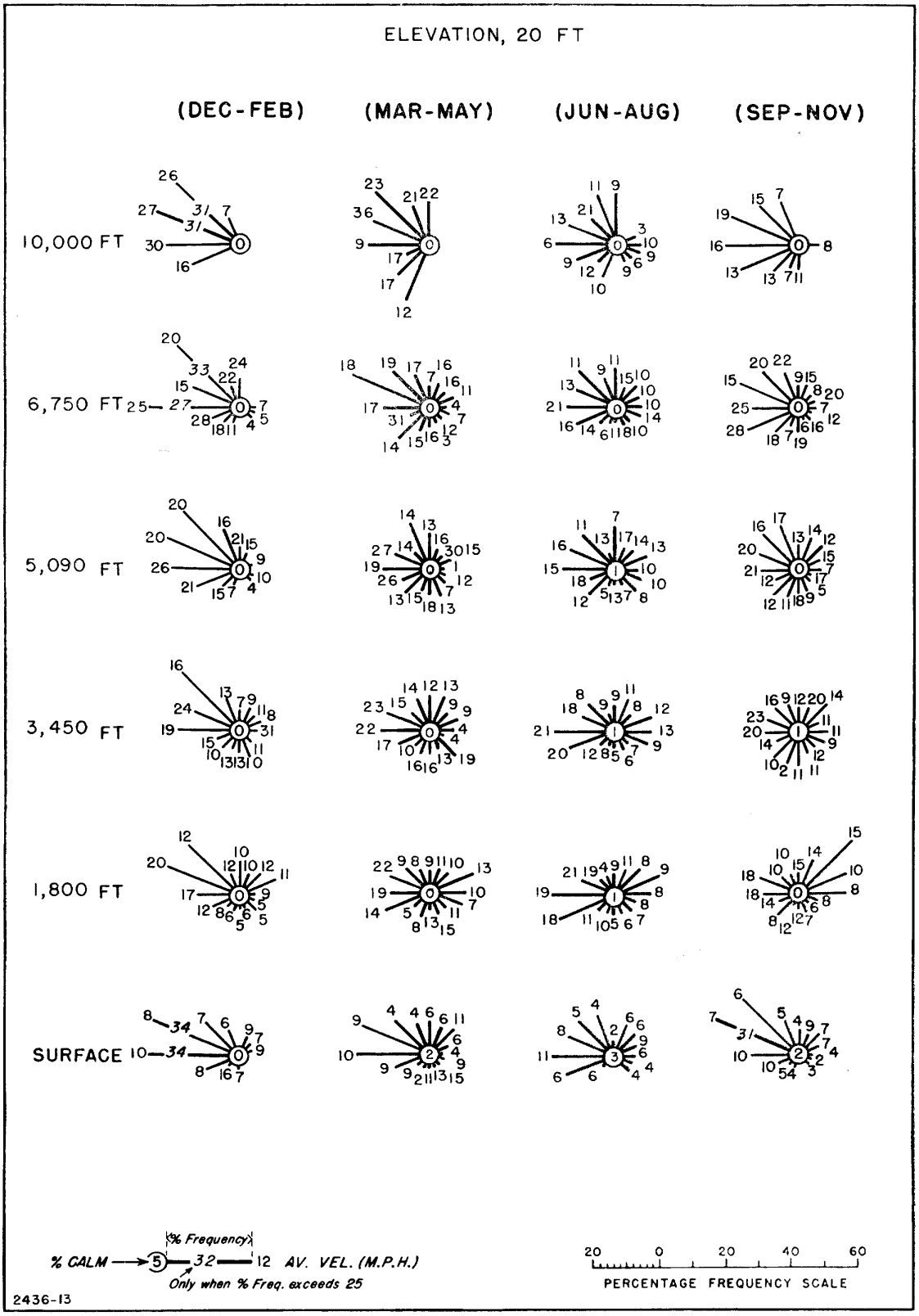


FIGURE V - 20.
Upper Air Wind Roses for Miyazaki.

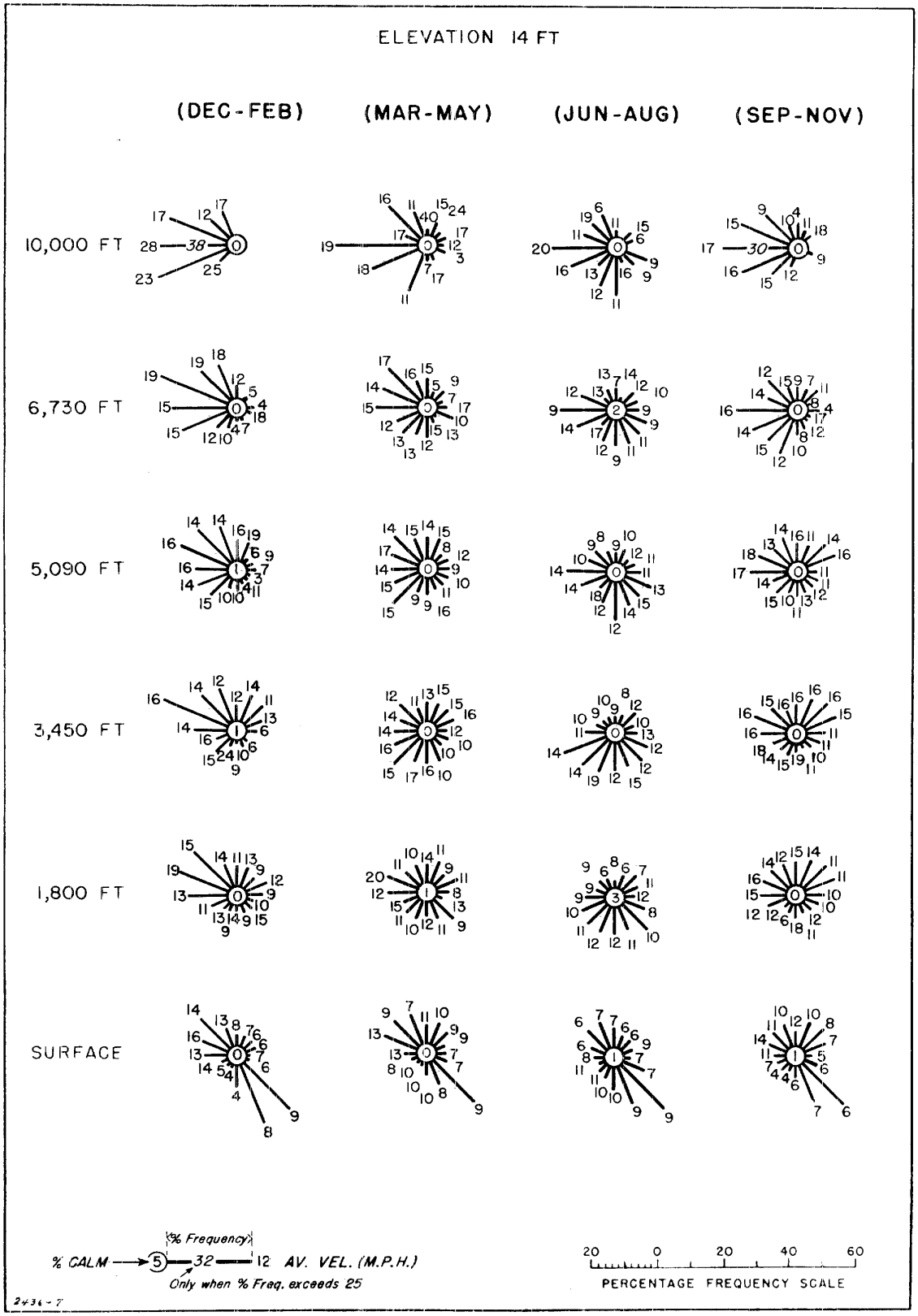


FIGURE V - 21.
Upper Air Wind Roses for Fukuoka.

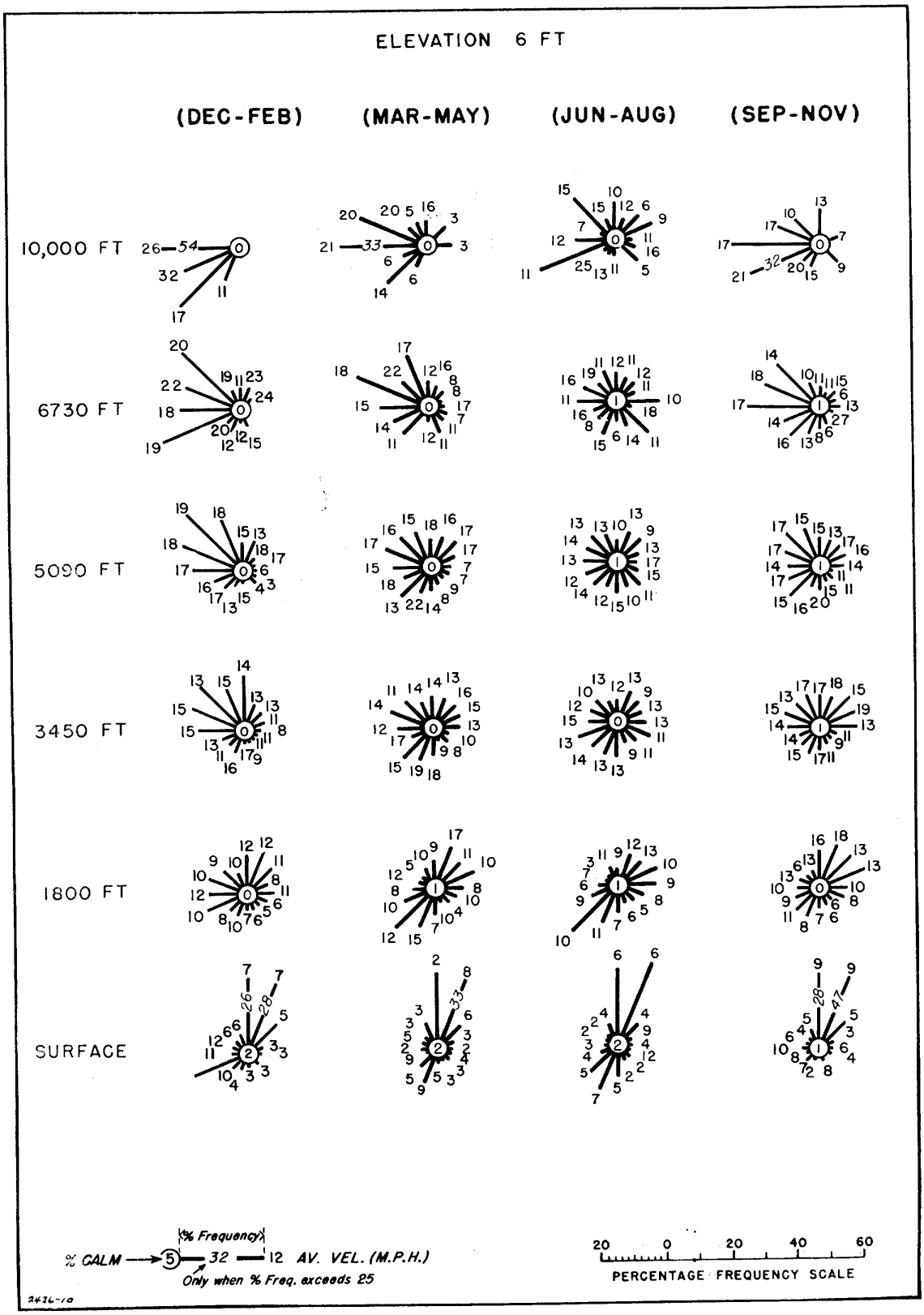


FIGURE V - 22.
Upper Air Wind Roses for Hiroshima.

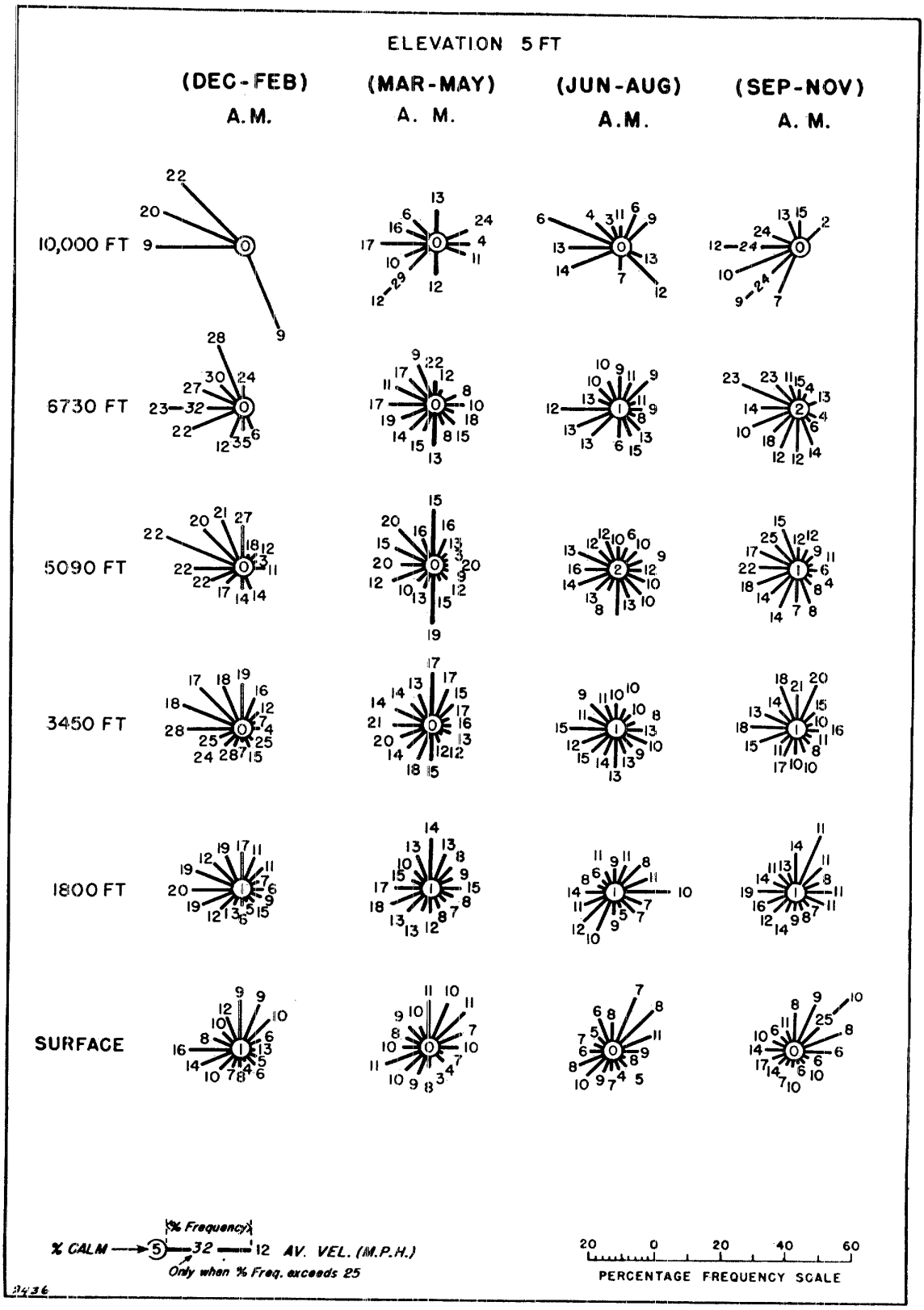


FIGURE V - 23.
Upper Air Wind Roses for Ōsaka (AM observations).

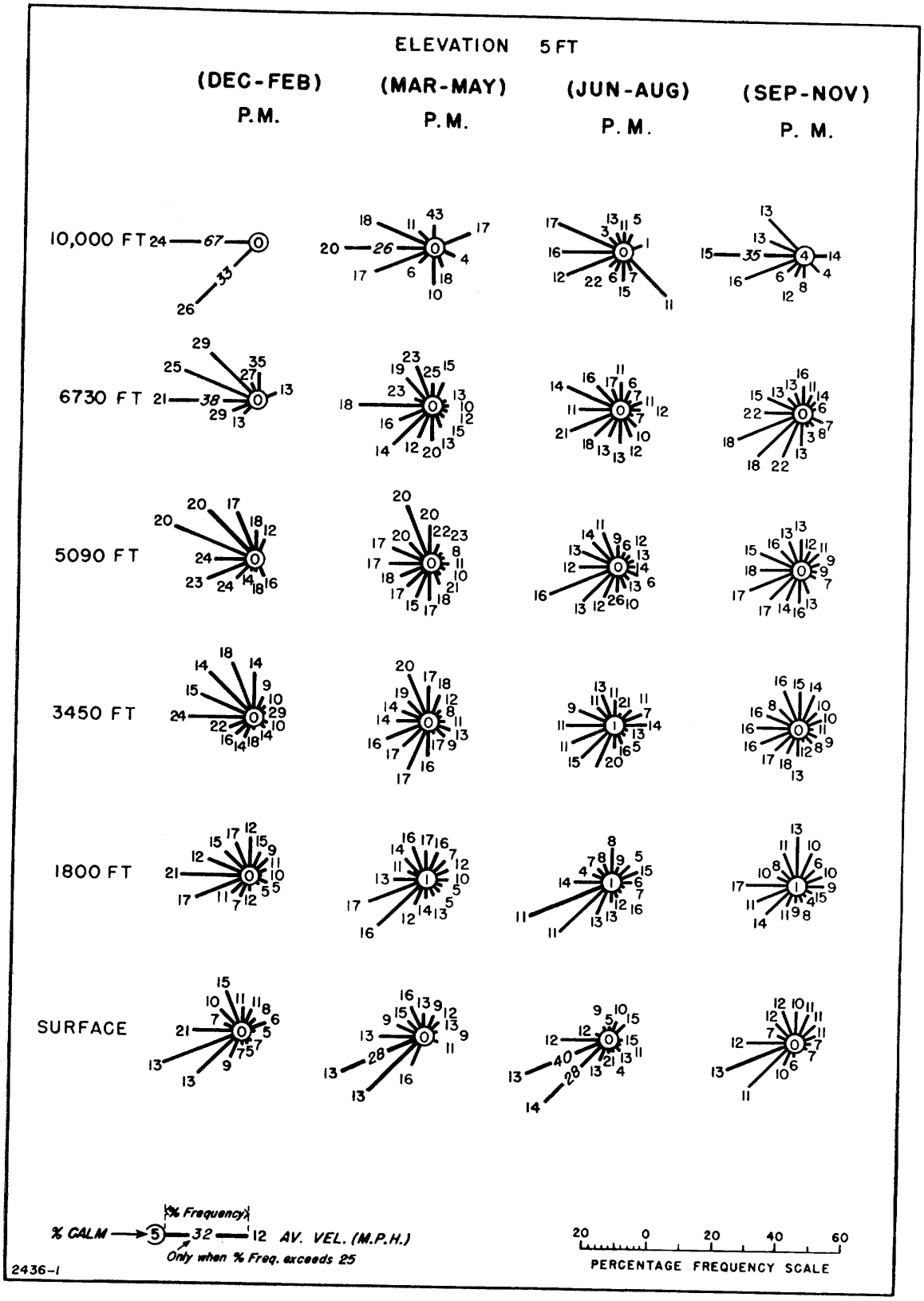


FIGURE V - 24.
Upper Air Wind Roses for Ōsaka (PM observations).

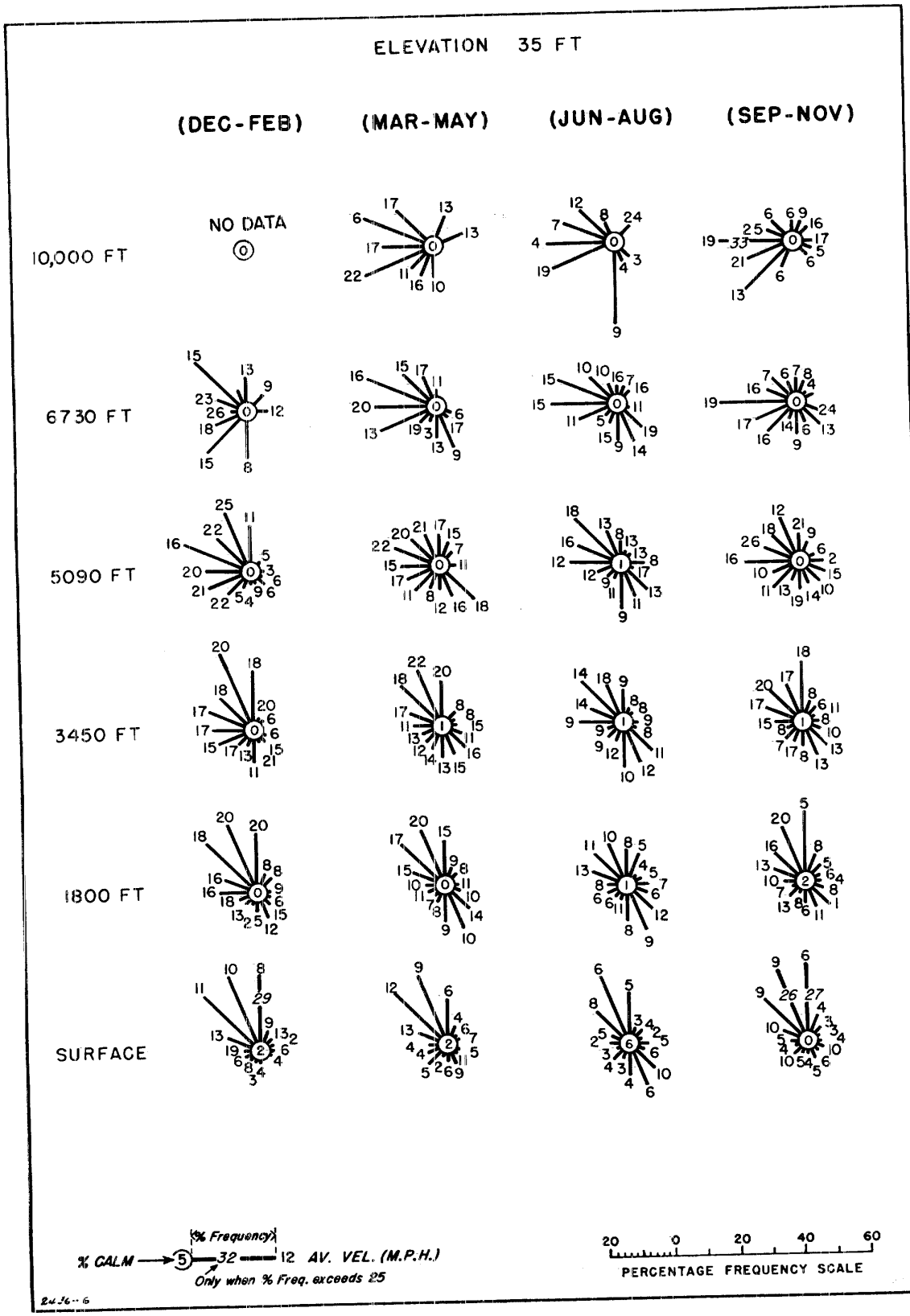


FIGURE V - 25.
Upper Air Wind Roses for Nagoya.

wind speeds may greatly exceed the mean wind speeds at times of rapidly deepening storms off the Japanese coasts, and the latest advice on the winds aloft should be received from the weather officer before taking any flight over Japan.

(3) ***High-level visual bombing operations.***

High-level visual bombing requires that the target be visible from the flight level of the bombing planes. The suitable conditions for such operations include a cloud cover of not more than 30%, with no obstructions to visibility and no pronounced frontal activity. The average number of days with suitable conditions are shown in TABLE V - 11. The data are for the 2 observation periods, 0600 and 1800 local time, and may be compared with the number of clear days for the same area (Topic 53, TABLE V - 38). The particular advantage of this type of presentation is that the breakdown by airflow types may be related to synoptic charts: a distinct help to the weather officer in forecasting periods suitable for the successful conclusion of high-level bombing missions.

(4) ***Parachute operations.***

(*a*) *Surface wind speeds.* Landings by parachute are adversely affected by high surface wind speeds. The frequencies of selected groupings of wind speeds are given in TABLE V - 37. From this table the number of days with velocities less than 13 m.p.h. may be taken as the number of days on which wind speeds will permit successful parachute landings. Parachute landings are most likely to be successful in summer, and they are the least likely to be successful in winter, when consideration is given to wind speed alone. Furthermore, it is shown in FIGURE V - 19 that the strongest winds are to be expected in the afternoon hours and the lightest winds occur in the early morning hours.

(*b*) *Visibility.* Fog and visibility conditions have been discussed under the section for low-level bombing operations (Topic 52, B, (2)).

(5) ***Incendiary bombing operations.***

(*a*) *Synoptic situations favorable for incendiary bombing.* Conditions are considered favorable for incendiary bombing if surface wind speeds are 12 m.p.h. or greater and there is no precipitation. The most favorable wind conditions occur in the afternoon, and the highest percentages of days favorable for incendiary bombing occur in winter and spring. In winter numerous cyclonic storms result in strong, dry winds on lee slopes, and the steady, winter monsoon results in a high percentage of clear weather on the southeast side of Honshū. In the spring, high wind velocities are a result of the steep lapse rates which occur when the cold air from Siberia is warmed in passing over the Japan Sea. Steep lapse rates and strong winds may also result from dynamic warming of air descending the lee slopes of the mountains of southern and eastern Honshū.

The details of the occurrence of weather favorable for incendiary bombing broken down according to types of air flow, are given in the column headed, "Surface Wind Speeds 12 m.p.h. or Over" in each of the tables under the flow type charts (Topic 51, B, TABLES V - 3 to V - 8). These tables show that the most favorable conditions occur during the NW type

TABLE V - 11.
AVERAGE NUMBER OF DAYS WITH CONDITIONS SUITABLE FOR HIGH-LEVEL VISUAL BOMBING OPERATIONS#

0600 L.C.T.

STATIONS	DEC	JAN	FEB	WINTER	MAR	APR	MAY	SPRING	JUN	JUL	AUG	SUMMER	SEP	OCT	NOV	AUTUMN
Kagoshima	9	8	5	22	7	6	4	17	2	5	5	12	7	8	8	23
Nagasaki	8	6	5	19	7	6	7	19	4	5	5	14	6	10	8	24
Fukuoka	5	5	3	14	5	5	6	16	3	5	7	15	4	8	6	18
Shimonoseki	5	4	3	13	6	5	5	17	3	5	5	13	4	6	6	15
Ōita	10	10	9	29	9	8	7	24	4	7	8	19	5	9	8	22
Hiroshima	9	8	7	24	9	7	9	25	5	5	6	16	6	9	9	24
Hamada	4	4	2	10	6	5	6	18	6	6	5	17	5	8	6	19
Shimizu	9	10	8	27	9	6	5	20	2	4	5	11	6	7	6	19
Kōchi	11	11	10	32	10	7	7	24	4	7	6	17	7	8	7	22
Tokushima	8	8	7	23	7	7	6	20	3	6	5	14	4	6	7	18
Shiono-misaki	6	7	6	18	6	5	5	16	3	4	6	13	5	5	6	16
Kōbe	7	9	7	23	8	6	9	23	4	3	7	15	5	8	7	20
Ōsaka	11	12	9	32	9	7	8	25	6	7	9	21	7	8	10	24
Kyōto	6	9	4	19	7	6	7	21	6	4	5	15	5	6	6	17
Miyazu	4	3	1	8	6	5	6	17	5	5	7	17	4	5	4	13
Nagoya	11	10	8	29	9	7	6	23	5	4	6	15	5	6	7	18
Hamamatsu	13	13	11	38	10	7	8	25	5	6	8	18	6	7	10	24

1800 L.C.T.

Kagoshima	9	7	6	21	7	5	5	17	2	5	5	11	4	8	8	21
Nagasaki	5	5	5	14	5	6	6	17	3	4	5	12	5	8	7	20
Fukuoka	5	3	4	12	5	6	5	15	3	3	5	11	4	8	6	18
Shimonoseki	5	4	4	13	5	7	6	18	4	5	6	15	5	8	6	18
Ōita	10	9	9	29	9	8	7	24	4	6	6	16	5	10	9	24
Hiroshima	8	7	6	21	8	6	7	22	4	6	7	17	5	8	10	22
Hamada	5	2	3	10	5	6	8	19	3	4	5	12	6	8	5	19
Shimizu	10	5	7	22	7	7	6	20	2	5	5	12	6	7	8	21
Kōchi	13	10	10	33	8	6	5	19	2	5	3	11	6	8	10	25
Tokushima	0	0	14	14	0	0	0	0	0	0	0	0	0	0	0	0
Shiono-misaki	7	9	7	22	8	4	4	16	3	4	6	13	5	5	6	16
Kōbe	0	0	14	14	0	0	0	0	0	0	31	31	0	0	0	0
Ōsaka	13	11	6	29	9	6	7	22	4	5	6	15	6	9	11	25
Kyōto	0	0	0	0	0	0	0	0	0	0	16	16	0	0	0	0
Miyazu	5	3	2	10	5	4	6	14	4	4	6	13	5	6	5	17
Nagoya	11	11	9	30	8	6	6	21	5	4	5	14	5	8	11	24
Hamamatsu	14	16	11	41	11	7	7	25	5	3	7	15	6	8	13	26

#Suitable conditions: Less than 35% of sky covered by clouds of all types, no obstruction to visibility (such as rain, dust, haze, fog, etc.) and no pronounced frontal activity.

TABLE V - 12.
AVERAGE NUMBER OF DAYS WITH CONDITIONS SUITABLE FOR INCENDIARY BOMBING#

STATIONS	DEC	JAN	FEB	WINTER	MAR	APR	MAY	SPRING	JUN	JUL	AUG	SUMMER	SEP	OCT	NOV	AUTUMN
0600 L.C.T.																
Kagoshima	1	*	1	2	1	1	1	3	1	*	1	2	1	1	1	2
Nagasaki	4	4	3	11	4	4	3	11	3	4	4	12	2	2	3	8
Fukuoka	2	2	2	7	2	1	*	3	*	1	*	1	*	1	1	2
Shimonoseki	8	10	8	27	9	7	7	24	6	5	7	18	4	3	6	13
Ōita	2	1	2	5	1	1	*	3	*	*	0	*	1	1	1	3
Hiroshima	*	*	*	1	*	1	*	1	*	*	*	*	*	2	1	3
Hamada	6	4	4	15	5	4	3	11	2	3	3	8	1	2	4	7
Shimizu	*	*	0	1	*	*	*	1	*	1	2	3	1	1	0	2
Kōchi	0	*	0	*	*	0	0	*	0	*	*	*	*	*	0	*
Tokushima	3	3	3	8	2	2	2	5	1	1	1	3	1	2	2	5
Shiono-misaki	6	8	5	19	6	4	3	12	3	3	3	8	3	3	3	9
Kōbe	3	3	2	8	2	2	2	6	2	1	2	6	2	2	2	6
Ōsaka	3	4	3	9	2	1	1	4	*	*	*	1	*	*	2	2
Kyōto	*	*	0	*	0	*	0	*	0	0	*	*	*	0	*	*
Miyazu	2	1	1	4	2	2	1	5	1	*	1	2	*	1	1	2
Nagoya	1	1	1	3	3	2	1	6	*	*	*	1	*	1	1	2
Hamamatsu	5	8	6	18	7	4	2	12	1	*	*	1	*	2	3	6
1800 L.C.T.																
Kagoshima	1	1	2	4	3	2	2	6	1	1	2	4	1	1	1	3
Nagasaki	3	4	4	11	7	4	3	14	3	4	5	11	3	2	3	8
Fukuoka	1	1	2	5	3	2	1	6	1	1	*	2	1	*	1	22
Shimonoseki	8	8	8	24	8	7	9	23	8	8	8	24	4	3	5	12
Ōita	2	2	3	8	4	3	2	9	1	*	1	2	1	2	2	4
Hiroshima	1	1	1	2	2	1	*	3	0	0	0	0	*	1	*	2
Hamada	5	5	5	15	6	5	4	15	2	5	3	9	2	2	4	8
Shimizu	1	1	*	1	1	2	*	3	1	1	1	3	1	0	*	1
Kōchi	*	*	*	1	1	*	*	1	*	0	*	*	*	*	*	*
Tokushima	0	0	0	0	0	0	0	0	0	0	0	0	0	16	0	16
Shiono-misaki	5	8	8	21	10	7	5	21	6	5	5	16	3	3	4	10
Kōbe	16	0	0	16	0	0	31	31	0	0	0	0	0	0	0	0
Ōsaka	4	5	4	13	5	5	3	13	2	5	4	12	2	1	2	5
Kyōto	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Miyazu	1	1	1	3	1	2	2	5	*	1	1	1	1	1	1	3
Nagoya	4	6	8	19	11	10	9	30	7	4	4	15	3	3	3	9
Hamamatsu	8	12	12	32	12	7	6	25	4	3	2	9	2	2	6	10

#Suitable conditions: Wind speed over 12 m.p.h., no precipitation, and good visibility.
*Less than 0.5 day.

TABLE V - 13.
WEATHER CONDITIONS SUITABLE FOR INCENDIARY BOMBING ACCORDING TO SYNOPTIC TYPES*

SEASON AND SYNOPTIC TYPE	MEAN NO. OF DAYS PER SEASON ON WHICH TYPE OCCURS	MEAN PERCENTAGE FREQUENCY OF WEATHER CONDITIONS SUITABLE FOR INCENDIARY BOMBING AT: KAGOSHIMA		NAGASAKI		SHIMONOSEKI		HAMADA		KŌCHI		ŌSAKA		MIYAZU		NAGOYA	
		0600	1800	0600	1800	0600	1800	0600	1800	0600	1800	0600	1800	0600	1800	0600	1800
Winter																	
NE	26	0	4	3	4	14	7	4	9	1	2	3	3	4	9	4	38
SE	3	0	0	15	0	25	38	5	0	0	0	0	0	0	0	0	0
SW	3	0	0	24	29	18	13	29	20	0	0	0	0	27	15	0	0
NW	18	1	11	23	34	60	55	29	41	0	2	24	42	4	0	5	21
N	16	1	8	19	29	44	35	23	22	0	2	22	30	5	2	10	41
R	13	0	0	5	3	14	10	14	10	2	0	2	0	5	2	0	11
Spring																	
NE	22	1	1	10	18	3	3	5	15	0	3	2	19	4	9	18	53
SE	6	8	7	8	3	47	26	0	0	0	0	6	5	0	5	0	0
SW	12	0	0	35	22	26	29	35	31	3	0	5	14	13	8	2	24
NW	7	3	10	16	52	54	43	38	43	0	0	16	26	6	3	18	76
N	5	8	7	15	26	27	15	8	22	0	4	15	27	11	16	52	69
R	18	0	5	9	4	23	16	9	8	0	0	0	2	1	2	1	32
Summer																	
NE	9	0	0	0	9	2	7	2	4	0	0	0	11	2	2	2	24
SE	12	6	6	13	10	51	47	0	0	0	0	7	23	0	2	0	13
SW	24	0	0	19	23	14	15	13	15	0	0	1	18	5	2	2	16
NW	3	0	6	0	6	19	31	27	25	0	0	0	0	0	0	0	45
N	1	0	0	0	0	0	17	0	17	0	0	0	0	0	0	0	3
R	13	0	2	3	2	17	27	4	4	0	0	0	12	0	0	1	3
Autumn																	
NE	28	1	2	7	3	4	3	4	5	1	1	0	4	3	6	4	17
SE	8	6	3	9	3	24	31	0	0	0	0	2	10	0	2	0	0
SW	3	0	0	20	31	10	23	0	8	0	0	0	12	21	0	5	8
NW	9	0	2	17	18	51	44	37	33	0	0	18	25	5	3	5	14
N	5	0	0	0	7	12	10	12	13	0	8	8	5	0	5	4	33
R	16	0	0	4	0	9	8	4	8	0	0	0	0	0	0	1	0

*Suitable conditions: Wind speed over 12 m.p.h., no precipitation.

of flow in winter, the NW and SW types in spring, and the NW type in fall. In summer the frequency of favorable weather is low for all types of air flow; the only instances where 40% or more of the days are favorable are at Shimonoseki with a SE type of flow, and at Nagoya, with a NW flow. During the entire year, Shimonoseki, on the western extremity of Honshū, is the only station in the tables which shows over 30% favorable weather conditions with a SE type of flow. Generally there are no occurrences of favorable conditions with a SE type of flow, but as high as 76% of the days are favorable with a NW type of flow (Nagoya in the spring at the 1800 L.C.T. observation TABLE V - 13).

The above-mentioned statistics do not take humidity into consideration. Humidity is sometimes as important as wind velocity, since it determines whether or not the fuel is highly inflammable or only slightly so. The relative humidity is the lowest at most stations when the flow is from the north or northwest, when the winds are downslope, and during the afternoon. Seasonally, humidity conditions are most favorable in spring, though favorable humidities may occur in fall. The most ideal conditions occur when winds are high, humidities are low, and no rain has fallen for several days.

C. Amphibious operations.

This topic is restricted chiefly to a discussion of the relationship between surface wind speeds, synoptic weather patterns, visibilities and cloudiness. The very important element of the state of the sea is barely touched upon here; it is discussed in detail under naval operations (Topic 52, D).

(1) *Surface wind speeds.*

(TABLES V - 34 to V - 35 and FIGURE V - 19).

A number of factors enter into the relationship between surface wind speed and wave height, in which are included the exposure of the coastal area being considered (CHAPTER IV), the fetch or distance over which the wave-producing winds blow, and the depth of the coastal waters. In an area where the configuration of the coastline is as irregular as that found in Japan, it becomes impossible to generalize. Each small section of the coast must be considered separately in its relation to adjacent sections and to the more general wind-flow patterns. In some sections the effects of air flow upon the surface waters become very complex and are worthy of careful and detailed studies which are beyond the immediate scope of this report. In such sections are included the Seto-naikai (Inland Sea) and the adjoining channels which separate the islands of Kyūshū, Shikoku, and Honshū. However, in other more exposed localities, such as Shimizu, Kōchi, Shiono-misaki, and Hamada, it is possible to select the number of days per month in which the winds are onshore with velocities greater than 12 m.p.h. (TABLE V - 37) and to use that as a criterion of the number of days with disturbed sea conditions. Along the northern coast of southern Honshū the most frequent adverse sea conditions occur in the cooler months of the year. In other sections the seasonal contrast is not nearly so well marked. The selection of days with favorable or adverse sea conditions may further be related to the air-flow patterns. Again, along the north coast of southwestern Honshū, the NW, N, and NE air-flow patterns are most likely to bring disturbed sea conditions. At Nagasaki disturbed sea conditions are most likely with the SW air-flow pattern, while at Nagoya they are most likely to be associated with SE or S air flow up the Iseno-umi. Reference may be made again to the diurnal distribution of wind speed (FIGURE V - 19) in which it is shown that the lighter winds and therefore the more favorable conditions occur in the early morning hours, while the afternoon hours are the least favorable.

(2) *Land and sea breezes.*

Diurnal heating and nocturnal cooling cause local changes in the pressure gradients between land and sea. These changes are most evident in the summer season when the pressure gradients of the general circulation are weakest. In the daytime the pressure gradient is directed towards lower pressure over the land, and the local winds acquire a component from the sea to the land. This local sea breeze develops in midmorning, is strongest in midafternoon, and dies down rather rapidly after sunset. At night the conditions are reversed and the local winds acquire a component from the land to the sea. The land breeze ordinarily sets in around 2300 or midnight, becomes strongest just before sunrise, and dies out shortly after sunrise. The land breeze is much weaker and shallower than the sea breeze, and in many localities may be entirely lacking.

(3) *Visibility.*

Visibility has already been discussed in some detail in connection with air operations (Topic 52, B). Cases of poor visibility are rather common over the south coastal regions in summer when tropical maritime air overlies the region. Haze associated with tropical maritime air occurs most frequently with gentle air flow from the southeast, south or southwest. The haze is confined to the lower levels of the atmosphere, and excellent visibility occurs simultaneously at high levels. Thus high mountains may be seen for great distances from an airplane flying above the haze layer while objects on the ground are rendered indistinct. At the surface, visibility may be reduced to a very few miles. This is especially the case in those years when precipitation is light and drought threatens. Improved conditions are to be expected after the occurrence of general rains.

(4) *Cloudiness.*

Cloudiness is important in amphibious operations to the extent to which concealment is afforded the landing of troops and equipment and also to the extent to which air support is aided or hampered. Cloudiness and low ceilings have been discussed in some detail under air operations. A few of the facts which apply specifically to amphibious operations may be emphasized here.

Under conditions of northeast, north, or northwest air flow when low pressure lies well to the south or east of the Japanese islands, localities in the lee of high mountains, such as Kōchi, experience clear weather. At the same time, the northern slopes of the mountains and the northern coast are enveloped in low clouds. Furthermore, the cloud deck re-forms some distance off the south coast, probably within sight of the land. Thus, under these conditions, amphibious operations approaching the south coast would have a cloud cover nearly to the landing point, but the landing point itself would be in the clear.

In the summer, rather different conditions prevail. The exposed coastal localities under conditions of sustained southeast, south, or southwest air flow are likely to experience low over-

cast with frequent rains which extend well into the mountainous country of the interior. At the same time, in the absence of storm centers, scattered-to-broken clouds are general over the open sea. Under these conditions, amphibious operations might be detected approaching the islands from the south, but would have the protection of low overcast at the shoreline.

At all seasons of the year, a storm center near or over Kyūshū, Shikoku, or southern Honshū results in a widespread area of low overcast. Under these conditions, low overcast conceals amphibious operations to the shore line and protects the landing operations. If the landings are to take place in sheltered bays, the presence of a storm center may be the most favorable condititon of all. In any proposed landing operation, the weather officer should be consulted for the latest synoptic information, and detailed forecasts should be issued to cover the period of the landings.

D. Naval operations.

The many variable factors connected with the planning of naval operations determine the weather conditions desired for a specific attack. Since the probability of occurrence of favorable weather can be established only after limiting conditions are specified for a particular operation, this report is limited to a general discussion of the weather elements most important from an operational standpoint—wind, sea and swell, cloud cover, and visibility.

This section of the report is concerned with weather over the ocean area extending from 125°E to 140°E and from 30°N to 40°N. The principal weather controls in this area are the northwest monsoon in winter and the southwest monsoon in summer. Extratropical cyclones, most frequent in spring, and tropical cyclones, most frequent in autumn, also affect the area.

(1) *Winds.*

The strongest and steadiest winds of the year are observed during the winter monsoon (November through March). They blow from the north or northwest from 40% to 60% of the time. Off the west coast of Kyūshū northerlies and northwesterlies are even more consistent, appearing in 60% to 70% of the observations. Wind velocities average from 12 to 14 knots, the strongest winds coming from the north or northwest. Velocities greater than 10 knots appear in 60% to 70% of the January observations and occur 50% of the time during the other months of the season. Winds of gale force are most frequent during strong outbreaks of cold air from Siberia. Velocities as high as 45 to 55 knots have been observed. Winds are strongest along the exposed west coast of Kyūshū. Due to the funneling effect of the Korea Strait, winds there tend to increase when they blow from a northeasterly direction.

During April and May, winds are veering from a northerly to southerly direction and by the end of June the southwest monsoon has established itself.

The summer monsoon is comparatively weak and winds at this time of year are variable, blowing from the south or southwest less than 30% to 40% of the time. Wind velocities diminish from April until August and in June, July, and August generally average 7 to 8 knots with 3 or 4 calms occuring in each summer month. Gales are infrequent; however, in the late summer the number of typhoons affecting the area increases. These tropical storms pass through the area under consideration on an average of about 10 a year. From July through October, the normal expectancy is 1 to 3 a month with a maximum in September. Typhoon velocities in this latitude average between 40 and 60 knots but velocities greater than 80 knots have been recorded.

The months of September and October constitute a transitional period from summer to winter monsoon conditions. Southerly winds can be expected only 20% to 25% of the time. Northeast trade winds prevail during this transitional period and northwesterlies appear with increasing frequency toward the end of the period. Wind velocities average between 8 and 11 knots. By November winds from north to west predominate and the average velocity has increased to 11 or 12 knots. Gales, however, are not characteristic of this transitional season except when a typhoon approaches the area.

(2) *Sea and swell.*

Both sea and swell are influenced by the character of the prevailing winds and are highest and most constant in direction during the winter monsoon. From December through March, north to northwest swell occurs about 40% of the time and northwest sea from 40% to 60% of the time. Southerly sea and swell are recorded in less than 10% of the observations. High swell (12 feet or greater) rarely appears more than 10% of the time, but high seas (greater than 5 feet) occur from 20% to 40% of the time. No swell or low swell (0 to 6 feet) occurs frequently during winter, but calm or low sea (0 to 2 feet) is observed only about 20% of the time. Highest sea and swell come from the north or northwest.

During April the directions of both sea and swell become quite variable and remain so throughout the summer. Predominant directions from April to September are south and southwest; however, all directions are observed. During October and November, sea and swell from the north to east quadrant are common. Practically no high swell is observed during June, July, and November. The slight increase in high swell during August and September can probably be attributed to typhoon activity. High seas occur less than 15% of the time from May through July, but are more frequent off the west coast of Kyūshū. No swell is reported more than 40% of the time during July. The occurrence of calm to low seas reaches a maximum of 50% to 60% in July and after that decreases in frequency until winter conditions prevail. High seas occur less than 15% of the time from May through July, but are more frequent off the west coast of Kyūshū. More detailed information on sea and swell is given in Chapter III.

(3) *Cloudiness and precipitation.*

During the winter monsoon much cloud cover and precipitation occur over the western coast of the area and the bordering sea. During January and February, cloud cover over the Japan Sea averages 6 to 7 tenths increasing to 7 to 8 tenths near the western coastline of Honshū. Pacific coastal waters to the southeast have considerably less cloud cover due to the drying effect of the land mass over which the northwest winds must pass. Cloud cover generally averages 5 tenths or less along the southeast coast of Japan but increases gradually to seaward. Low clouds are most frequent during this season and ceilings are generally about 2,000 feet, lowering during periods of precipi-

tation. Observations taken at 12 noon GCT show that precipitation at that hour of the day is observed 10% to 15% of the time.

Beginning in April there is a slight decrease in cloudiness and precipitation off the western shores. At the start of the summer monsoon in June, however, there is a definite maximum in all sectors. Cloud cover will average nearly 7 tenths and precipitation will occur more than 20% of the time. Following the brief rainy season, conditions improve considerably and the fairest weather of the year occurs in August except when typhoons (about 2 or 3 typhoons may be expected during this month) invade the area. During this month, sky cover averages less than 5 tenths and precipitation is relatively infrequent. The weather remains generally fair throughout the fall, except in periods when typhoons affect the area. From September through November, cloud cover generally averages about 5 tenths, increasing to 6 tenths by December. Precipitation also increases during this season along with increasing cloud cover.

(4) Visibility.

The principal restriction to visibility during the winter months is the widespread precipitation that accompanies the northwest monsoon. This restriction would occur most frequently off the Japan Sea coast and would be least prevalent off the southern shores. With air temperature from 5 to 10 degrees colder than the sea surface, fog is rare at this time of year.

In April southerly winds appear with increasing frequency and warmer air flows over the Japanese coastal waters. Fog over the ocean will be observed about 5% to 10% of the time from April to September. Fog is most frequent in the Japan Sea. Approximately 100 miles off the west coast of Honshū, fog is reported in 10% to 15% of the observations taken during the summer months. Haze will also be observed on from 3 to 5 days a month during the spring and summer.

E. Chemical warfare.

Meteorological conditions favorable for chemical warfare include low surface wind speeds, no precipitation, and stable conditions in the lowest levels of the atmosphere.

(1) Surface wind speeds and directions.

Since gases used in chemical warfare are not adequately dispersed under calm conditions and are too quickly and too widely dispersed by strong winds, days suitable for chemical warfare are those days with wind speeds 3 to 12 m.p.h. and without precipitation. The average number of suitable days is shown in TABLE V - 14 for selected stations in Kyūshū, Shikoku, and southwestern Honshū. For a breakdown by the primary air-flow types, the tables given in the discussion of air-flow patterns may be consulted. Chemical warfare may be most successfully carried on in the summer season when cyclonic activity is at a minimum. The most favorable area for chemical warfare is the Seto-naikai region, where light winds are of frequent occurrence. The early morning hours are the most favorable time of day and the afternoon hours the least favorable time of day for chemical warfare (FIGURE V - 19).

(2) Turbulence and stability.

Stable conditions of the atmosphere most commonly occur with high pressure, discussed under the air-flow patterns as the ridge or *high* type. Stable conditions are further limited to those days on which a high pressure area is moving into the Japanese islands, since convection caused by surface heating very quickly takes place in the lower levels of a stagnant high-pressure area. Convective turbulence, however, ceases at night. The early morning hours have the most stable conditions of the day.

(3) Temperature (TABLES V - 25 to V - 30).

Temperature controls the rate of vaporization of chemical agents used in chemical warfare. Vaporization is accelerated in warm weather and practically ceases in subfreezing weather. Over Kyūshū, Shikoku, and southwestern Honshū, excessively high temperatures do not occur, and subfreezing weather of winter is of very short duration over the lowland areas. As far as limitations of temperature are concerned, chemical warfare may take place successfully at any time during the spring, summer, and autumn months, and over 90% of the time during the winter months.

Only the lowland areas of Southwest Japan have been considered in the foregoing discussion of chemical warfare. Conditions of surface wind, of turbulence, and, in the winter, of temperature over the high mountain regions are generally unfavorable for the carrying on of chemical warfare.

(4) Humidity.

When the other factors which determine the practicability of chemical warfare in Japan are found to be favorable, it will usually be found that the relative humidity also is suitable. It does not, however, follow that all factors are suitable when humidity is most favorable. Very low humidities may occur in the south of the region when strong downslope winds sweep over the coastal regions, but in that instance the wind factor is unfavorable for chemical warfare. Very low humidities may occur also in midsummer of some years when drought conditions are widespread, but the turbulence factor is unsatisfactory because of strong surface convection. Furthermore, the lowest humidities usually occur in the midafternoon when the local winds are likely to be the strongest.

(5) Synoptic weather patterns favorable for chemical warfare.

A general idea of the regional variation of favorable conditions, according to types of air flow, may be obtained by examining the column headed "Surface Winds 3 to 12 m.p.h. without Precipitation" under each of the various flow-type charts in Topic 51, B (TABLES V - 3 to V - 8).

It can be seen from these tables that the frequency of favorable conditions for chemical warfare varies as much from one season to another as it does from one type of air flow to another. Furthermore, there is a great deal of regional variation which is largely due to topography and nearness to large bodies of water.

All the stations for which data are available are coastal, so the effect of topography is largely that of exposure. To analyze this influence, the 8 stations are divided into 2 groups: (a) those with a northerly exposure (Shimonoseki, Hamada, and

TABLE V - 14.
AVERAGE NUMBER OF DAYS WITH CONDITIONS SUITABLE FOR CHEMICAL WARFARE#
0600 L.C.T.

STATIONS	DEC	JAN	FEB	WINTER	MAR	APR	MAY	SPRING	JUN	JUL	AUG	SUMMER	SEP	OCT	NOV	AUTUMN
Kagoshima	17	16	14	48	19	15	15	48	10	11	14	35	16	20	20	57
Nagasaki	13	12	11	36	13	12	10	35	9	12	12	33	13	14	12	38
Fukuoka	13	15	13	41	15	10	12	37	9	11	10	30	9	9	12	29
Shimonoseki	13	13	11	37	14	13	15	42	14	15	17	46	16	18	15	48
Ōita	20	17	15	52	18	13	13	43	8	5	9	21	12	16	16	44
Hiroshima	12	9	9	29	10	12	12	34	10	7	10	26	12	16	13	41
Hamada	17	16	14	46	18	17	17	52	15	14	18	47	20	23	19	62
Shimizu	8	8	7	23	10	10	6	26	8	9	9	26	5	9	8	22
Kōchi	16	14	13	43	14	14	12	40	6	3	6	15	11	18	18	46
Tokushima	18	20	16	54	16	13	12	41	10	8	9	27	14	19	17	49
Shiono-misaki	18	20	19	56	18	17	18	54	16	17	19	52	16	19	20	55
Kōbe	17	19	16	52	17	16	14	47	9	11	15	35	15	18	18	51
Ōsaka	11	12	11	34	14	13	14	41	12	9	10	31	9	11	12	32
Kyōto	6	6	6	18	7	5	4	16	3	2	3	9	2	3	3	8
Miyazu	8	6	6	19	7	8	8	23	6	7	8	21	6	9	9	23
Nagoya	18	22	18	58	16	14	12	42	11	11	13	35	13	18	18	49
Hamamatsu	18	18	16	52	16	16	17	49	13	12	16	41	16	18	19	52
1800 L.C.T.																
Kagoshima	13	18	17	48	19	18	20	56	16	24	21	61	17	16	13	46
Nagasaki	18	19	16	52	17	17	20	55	20	22	22	64	20	20	15	54
Fukuoka	13	18	17	48	21	19	21	61	21	23	23	66	18	17	12	48
Shimonoseki	16	16	15	47	18	17	17	52	17	19	19	54	20	23	18	60
Ōita	14	18	13	45	14	12	13	38	13	16	14	43	10	12	11	33
Hiroshima	9	12	14	35	16	14	14	45	13	17	17	47	12	10	10	32
Hamada	17	14	14	44	14	13	15	43	15	15	18	49	15	17	18	49
Shimizu	9	14	15	37	18	17	18	52	19	22	22	63	12	6	5	24
Kōchi	10	15	15	39	13	9	7	29	7	7	6	20	4	5	8	17
Tokushima	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Shiono-misaki	20	18	16	54	14	15	17	47	16	20	18	55	17	19	20	55
Kōbe	0	0	0	0	31	0	0	31	30	0	31	61	0	16	0	16
Ōsaka	17	17	17	51	18	18	20	56	22	21	22	64	20	19	17	56
Kyōto	0	0	28	28	31	0	0	31	0	31	31	62	0	0	0	0
Miyazu	15	10	8	32	14	17	18	49	21	19	19	59	12	13	15	40
Nagoya	18	17	15	51	13	14	16	43	18	20	22	60	18	17	17	52
Hamamatsu	15	13	11	39	12	15	18	45	20	21	22	63	16	15	14	44

Suitable conditions: Wind speed 3-12 m.p.h. and no precipitation.

TABLE V - 15.
WEATHER CONDITIONS SUITABLE FOR CHEMICAL WARFARE ACCORDING TO FLOW TYPE*

SEASON AND FLOW TYPE	MEAN NO. OF DAYS PER SEASON ON WHICH TYPE OCCURS	MEAN PERCENTAGE FREQUENCY OF WEATHER CONDITIONS SUITABLE FOR CHEMICAL WARFARE AT: KAGOSHIMA		NAGASAKI		SHIMONOSEKI		HAMADA		KŌCHI		ŌSAKA		MIYAZU		NAGOYA	
		0600	1800	0600	1800	0600	1800	0600	1800	0600	1800	0600	1800	0600	1800	0600	1800
Winter																	
NE	26	50	40	50	69	52	67	69	57	49	44	33	70	21	35	70	46
SE	3	26	19	15	25	35	44	65	63	37	19	78	36	0	18	33	18
SW	3	31	27	24	36	35	40	35	13	40	0	40	25	33	35	33	30
NW	18	42	58	37	45	20	32	32	30	41	61	54	45	24	37	68	67
N	16	56	74	55	52	37	48	43	49	52	61	44	59	19	22	76	51
R	13	67	44	37	67	68	75	71	63	72	25	41	44	18	47	59	56
Spring																	
NE	22	52	63	53	69	57	82	59	58	45	42	52	61	39	61	57	37
SE	6	36	29	31	29	31	39	69	42	30	13	62	55	12	33	29	59
SW	12	46	58	44	55	54	49	39	38	49	15	42	57	42	57	31	51
NW	7	51	86	49	41	38	50	35	38	50	60	41	53	33	41	55	24
N	5	42	82	50	67	54	78	42	56	46	74	52	62	15	20	37	27
R	18	56	70	37	78	59	72	75	58	58	20	56	76	18	49	45	48
Summer																	
NE	9	40	84	46	87	48	89	65	91	34	22	37	78	13	71	56	54
SE	12	48	50	33	56	28	37	63	52	21	25	51	6	15	65	36	13
SW	24	10	64	39	59	64	65	37	48	8	21	22	69	34	57	38	59
NW	3	9	69	46	81	91	69	55	69	44	25	41	90	5	95	55	50
N	1	0	67	75	100	100	83	75	83	25	33	80	80	0	100	60	82
R	13	34	69	37	85	54	65	73	65	28	15	35	85	20	58	36	82
Autumn																	
NE	28	63	46	56	77	56	80	74	62	62	25	32	75	34	48	74	60
SE	8	42	50	51	50	44	39	73	47	35	17	65	57	11	22	20	48
SW	3	70	31	60	15	60	39	50	31	25	8	26	35	42	48	37	62
NW	9	39	55	39	67	27	49	32	47	52	47	41	61	35	59	52	73
N	5	56	61	68	74	48	84	72	55	59	29	39	90	39	50	65	50
R	16	67	33	27	48	60	73	86	50	79	10	49	55	16	55	57	59

*Suitable conditions: wind speeds-3-12 m.p.h. and no precipitation.

Miyazu, all on Honshū); (b) those with south or southwest exposure (Kagoshima and Nagasaki on Kyūshū, Kōchi on Shikoku, and Ōsaka and Nagoya on Honshū). TABLE V - 16 gives the averages, for both morning and evening observations, of the percentage frequency of days favorable for chemical warfare at the above-mentioned stations.

TABLE V - 16.

SEASONAL PERCENTAGE FREQUENCY OF DAYS FAVORABLE FOR CHEMICAL WARFARE

(Surface winds 3 to 12 m.p.h. without precipitation)

Type of Flow		NE	SE	SW	NW	N	Ridge & High
Season	*Exposure*						
Winter	North	50	38	32	29	36	57
	South	52	31	29	52	58	51
Spring	North	59	38	46	39	44	55
	South	53	37	45	51	54	54
Summer	North	63	43	51	64	74	56
	South	54	34	39	51	60	51
Autumn	North	59	39	45	42	58	57
	South	57	44	37	53	59	48

There is not much difference between conditions on the north- and south-facing slopes when the flow is from the northeast or southeast or when there is a ridge or *high* over the region. However, it is evident that, in the case of SW, NW, or N type of flow, there are marked differences. During the winter the north coast of Honshū is very unfavorable for chemical warfare when the flow is from the north or northwest, whereas, with the same types of flow, the south coasts have favorable conditions over 50% of the time. In winter best conditions occur on the north coast when there is a ridge or *high* over the area, or when the flow is from the northeast. Conditions are generally more favorable in summer than at any other time of the year, but when a southeast or southwest flow exists, they are poor on the southward-facing slopes, and are not very favorable on the north slopes. The best conditions for any season and any region occur in summer with a north type of flow.

Wind velocities are usually higher in the afternoon than in the morning; hence, as a rule, conditions are more favorable in the morning. However, in some places the air is very often calm in the morning, and wind speeds are increased just enough in the afternoon to be within the favorable limits. In such places the afternoon may be more favorable than the morning. An examination of TABLES V - 3 to V - 8 will reveal these local diurnal peculiarities. The hours of observation repesented in these and other tables do not indicate the extreme conditions, since the maximum of convective activity, and hence of diurnal wind velocity, usually occurs between 1300 and 1600 L.C.T. rather than at 1800 L.C.T., the hour of the evening observation. The 0600 L.C.T. observation does represent, approximately, the minimum convective activity and wind velocity, and the maximum of stability.

53. *Forecast Techniques and Exambles of Synoptic Charts*

A. Weather causes and empirical forecasting rules.

Forecast techniques can be considered either from a strictly local or a regional point of view.

From the strictly local viewpoint, the weather at selected stations in Kyūshū, Shikoku, and southwestern Honshū has been related to the direction of free air flow or gradient wind in the type tables (TABLES V - 3 to V - 8).

From a broader point of view, there are certain variations in the synoptic patterns, both within air flows and from one current to another, which bear discussion.

The ocean area to the south of this region, and to the east and northeast of Formosa, is a field of cyclogenesis, particularly during the winter half of the year. At that season it is common for a wave to form on the cold front, which lies semipermanently in the Formosa-Luzon area and thence runs eastward and northeastward. If the low centers, which deepen as a result of this cyclogenesis, pass close enough to southern Kyūshū, Shikoku, and Honshū, they cause by far the worst weather of the season, including low clouds, rain, and snow. The beneficial effects of downslope motion are at a minimum in such cases, since the overecast is caused by the overrunning of air masses above the hills and mountains.

The break-up of the winter monsoon is marked, in general, by 2 phenomena: (1) the high center in Siberia weakens considerably; (2) it moves southward or southeastward into China. In the absence of data for western Siberia, the appearance of the high center in China during winter is a reasonable sign that a frontal system will follow, moving across China from the northwest.

The summer monsoon, which brings southerly air flow over Kyūshū and the adjacent islands, is frequently interrupted by various other types of flow, the most radical departure from the normal flow occurring during typhoons of the summer and fall. The center of these typhoons may pass over any part of this area. Usually they are either in the process of recurvature or have recurved by the time the center reaches this area.

B. Examples of synoptic weather charts.

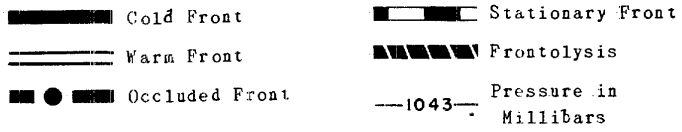
Synoptic maps have been chosen for the purpose of illustrating the seasonal circulation patterns and showing how these circulations change. These maps consist of surface and 10,000-foot analyses, selected from a series of Northern Hemisphere charts prepared and analyzed by the United States Weather Bureau, with slight modification in the case of the 10,000-foot (3-kilometer) charts, for which there was only a small amount of available data for the western Pacific.

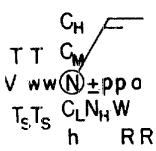
(1) Outbreak of winter type circulation.

The surface maps of November 24-27, 1934, illustrate an outbreak of the winter type of circulation in eastern Asia. This circulation is controlled principally by a dominant high-pressure area in Siberia. In this series of maps the influence of the high cell follows the passage of a cold front across northern China, the Hwang Hai (Yellow Sea), and, eventually, Japan.

To keep the number of synoptic maps at a minimum, it was thought sufficient to illustrate the outbreak of a winter type circulation without giving a winter series. Actually there is more variety in the winter synoptic patterns than one might at first suspect. In the first place, though it can be seen in Topic 51, B that northerly directions occupy about 43 of the winter air flows, the frequencies of these directions are almost equally distributed among the northeast, northwest, and north. One of the main causes of this distribution is the movement of frontal waves eastward and northeastward along the Polar Front which in winter lies to the south and east of Japan. These waves, fed by humid masses of maritime tropical air, usually develop into pronounced storms as they travel northeastward. The air flow over Kyūshū, Shikoku, and southwestern Honshū normally changes from northeasterly through northerly to northwesterly during the passage of one of these storms. Although frequently no fronts pass across Japan in such a series, overrunning of the polar air over Japan may result in heavy precipitation and windy, squally, weather, both of which accompany the deepening of the storm.

LEGEND
FOR WEATHER AND PRESSURE CHARTS





TT	Temperature
$T_S T_S$	Dewpoint Temperature
RR	Amount of Precipitation
W	Past Weather
V	Visibility
N	Cloud Coverage
	Station Circle
	Wind Direction
	Wind Speed (1 Barb = 2 on Beaufort Scale)

C_L	Type of Lower Cloud
C_M	Type of Middle Cloud
C_H	Type of High Cloud
N_H	Number of Low Clouds
h	Height of Low Clouds
±pp	Amount of Barometric Change
a	Barometric Tendency
ww	Present Weather

54. *Climatic Statistics*

Topic 54 consists of tables and graphs which give more detailed climatic information than has been presented in Topics 51 and 52. L.C.T. as used in these tables refers to 135th meridian time.

TABLE V - 17.
MEAN MONTHLY AND SEASONAL AMOUNTS OF PRECIPITATION (INCHES)

STATIONS	DEC	JAN	FEB	WIN	MAR	APR	MAY	SPR	JUN	JUL	AUG	SUM	SEP	OCT	NOV	AUT	YR
Kagoshima	3.4	3.4	4.0	10.8	6.4	8.7	8.2	23.3	17.1	12.2	7.4	36.7	8.7	5.2	3.8	17.7	88.5
Nagasaki	3.0	2.9	3.3	9.2	5.2	7.4	6.6	19.2	13.2	10.4	6.1	29.7	11.3	4.5	3.6	19.4	77.5
Fukuoka	3.0	2.8	3.3	9.1	4.4	5.1	5.1	14.6	10.2	7.7	5.2	23.1	8.1	4.2	2.9	15.2	62.0
Ōita	1.9	1.9	2.7	6.5	4.8	5.4	5.9	16.1	10.1	9.1	6.3	25.5	8.8	5.5	2.5	16.8	65.1
Shimonoseki	3.0	2.8	3.4	9.2	4.5	5.6	6.0	16.1	11.7	9.9	4.8	26.4	7.5	4.6	2.7	14.8	66.5
Hiroshima	2.0	2.2	2.5	6.7	4.3	6.2	6.0	16.5	10.1	8.8	4.3	23.2	8.2	4.1	2.4	14.7	61.1
Hamada	4.6	4.5	3.9	13.0	4.6	5.0	4.9	14.5	7.7	7.5	4.6	19.8	8.2	5.1	4.2	17.5	64.8
Ashizuri	3.0	2.2	4.7	9.9	5.5	6.2	9.6	21.3	9.6	6.8	8.2	24.6	14.0	9.3	6.0	29.3	85.2
Kōchi	2.9	2.8	3.9	9.6	7.4	10.6	10.9	28.9	14.0	12.9	13.0	39.9	15.9	8.0	4.2	28.1	106.4
Tokushima	2.3	2.0	2.4	6.7	4.0	5.1	6.1	15.2	7.8	7.6	7.7	23.1	12.5	7.4	3.5	23.4	68.3
Shiono-misaki	4.0	3.0	4.4	11.4	6.3	7.9	9.8	24.0	13.0	8.7	12.7	34.4	13.8	12.7	6.3	32.8	102.6
Kōbe	1.8	1.9	2.2	5.9	3.6	5.0	4.9	13.5	8.2	6.0	4.6	18.8	7.7	4.8	2.6	15.1	53.3
Ōsaka	1.9	2.0	2.3	6.2	4.0	5.2	5.2	14.4	8.2	6.4	4.2	18.8	7.5	5.0	2.7	15.2	54.6
Kyōto	2.2	2.6	2.8	7.6	4.3	6.0	5.9	16.2	9.3	7.8	5.7	22.8	8.7	5.0	2.8	16.5	63.1
Miyazu	8.4	8.0	6.4	22.8	6.0	5.0	4.4	15.4	7.1	5.9	7.3	20.3	9.8	6.5	5.2	21.5	80.0
Nagoya	2.3	2.4	2.8	7.5	4.8	6.4	6.5	17.7	9.0	7.0	6.9	22.9	9.6	6.2	3.2	19.0	67.1
Hamamatsu	2.7	2.7	2.8	8.2	5.6	7.2	8.1	20.9	10.0	8.6	8.8	27.4	11.8	7.1	4.1	23.0	79.5

TABLE V - 18.
GREATEST MONTHLY AND ANNUAL AMOUNTS OF PRECIPITATION (INCHES)

STATIONS	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	YR
Kagoshima	8.6	9.7	11.0	19.6	15.5	39.2	27.6	17.8	15.0	10.4	8.2	8.6	111.6
Nagasaki	7.7	8.2	9.4	20.1	15.8	38.8	31.4	28.4	38.3	12.9	9.5	8.6	106.4
Fukuoka	4.8	6.3	8.2	10.9	8.1	23.1	24.8	11.6	15.2	9.0	5.2	5.8	84.5
Hiroshima	5.1	7.7	9.1	9.4	11.4	26.2	21.6	10.2	20.0	8.2	4.4	4.4	100.0
Hamada	6.9	7.3	7.1	8.6	9.6	22.3	18.6	12.0	20.0	10.9	7.5	9.1	92.5
Kōbe	3.4	5.9	6.5	8.5	9.8	14.8	11.8	9.6	16.6	10.8	6.0	3.9	65.6
Ōsaka	4.5	6 3	6.6	9.8	9.9	15.1	12.2	9.9	14.2	10.5	7.1	4.4	67.8
Kyōto	6.4	6.8	8.3	12.8	12.6	24.3	24.7	13.7	17.7	10.1	8.0	6.1	84.7
Nagoya	5.6	10.0	7.7	8.2	10.7	13.3	14.0	14.2	18.8	12.5	8.5	5.2	79.7

TABLE V - 19.
LEAST MONTHLY AND ANNUAL AMOUNTS OF PRECIPITATION (INCHES)

STATIONS	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	YR
Kagoshima	0.9	1.2	1.0	3.6	2.2	7.4	2.0	2.1	1.6	0.6	1.4	1.1	60.7
Nagasaki	0.9	0.9	2.0	2.2	1.8	1.7	0.6	0.6	1.7	0.2	0.8	1.0	57.5
Fukuoka	0.8	1.5	0.9	1.7	1.0	3.4	1.2	0.6	2.4	0.3	1.4	0.8	46.8
Hiroshima	0.1	0.7	1.3	2.8	2.1	3.3	1.4	0.3	1.5	0.3	0.5	0.3	39.0
Hamada	1.5	1.4	2.6	2.0	1.9	1.9	2.0	0.7	2.1	2.5	2.7	2.1	51.5
Kōbe	0.2	1.0	1.0	2.2	1.8	2.4	1.0	1.1	2.4	1.9	0.9	0.3	36.7
Ōsaka	0.3	0.8	0.8	1.9	2.0	2.4	0.7	0.2	1.8	1.6	0.9	0.4	35.6
Kyōto	0.4	0.2	1.0	2.2	1.7	2.8	1.0	0.5	1.6	0.4	1.0	0.4	38.7
Nagoya	0.2	0.9	1.0	2.1	1.8	2.1	1.0	1.5	2.1	2.4	0.4	0.6	43.4

TABLE V - 20.
GREATEST PRECIPITATION IN 24 HOURS (INCHES)

STATIONS	DEC	JAN	FEB	WIN	MAR	APR	MAY	SPR	JUN	JUL	AUG	SUM	SEP	OCT	NOV	AUT	YR
Kagoshima	6.7	4.5	3.6	6.7	3.6	5.2	6.1	6.1	12.0	8.1	6.9	12.0	5.5	5.5	3.4	5.5	12.0
Nagasaki	4.4	3.3	3.4	4.4	3.7	4.6	5.3	5.3	15.2	6.7	8.0	15.2	12.3	5.2	3.4	12.3	15.2
Fukuoka	2.1	1.9	2.1	2.1	2.5	5.4	4.7	5.4	7.3	10.1	4.3	10.1	8.2	4.5	2.0	8.2	10.1
Ōita	4.5	1.6	2.6	4.5	3.6	3.1	5.5	5.5	4.4	7.4	17.5	17.5	9.8	12.9	3.4	12.9	17.5
Shimonoseki	2.3	1.6	2.2	2.3	2.3	4.6	5.0	5.0	13.3	6.7	5.7	13.3	6.4	4.4	2.4	6.4	13.3
Hiroshima	1.8	1.8	2.6	2.6	2.7	4.3	4.0	4.3	6.3	29.6	4.7	29.6	13.4	4.0	3.1	13.4	29.6
Hamada	2.2	2.0	2.6	2.6	2.0	2.5	3.9	3.9	4.3	8.0	8.9	8.9	5.4	3.3	1.9	5.4	8.9
Ashizuri	2.0	1.5	3.3	3.3	2.5	3.7	4.3	4.3	5.0	3.5	6.0	6.0	6.4	7.9	3.4	7.9	7.9
Kōchi	6.5	4.0	5.0	6.5	7.7	6.0	9.4	9.4	10.0	10.2	14.3	14.3	13.5	8.3	4.6	13.5	14.3
Tokushima	3.6	2.8	2.8	3.6	2.6	3.9	4.0	4.0	8.6	9.7	10.6	10.6	12.0	18.2	4.0	18.2	18.2
Shiono-misaki	3.1	2.3	3.5	3.5	3.8	4.9	7.5	7.5	11.1	5.7	9.0	11.1	8.3	11.4	5.9	11.4	11.4
Kōbe	1.8	1.6	2.3	2.3	2.5	2.6	3.4	3.4	5.9	4.6	4.6	5.9	7.8	3.9	2.7	7.8	7.8
Ōsaka	1.9	2.1	2.0	2.1	2.9	4.0	5.2	5.2	4.5	5.2	6.9	6.9	4.6	5.2	3.1	5.2	6.9
Kyōto	2.1	1.4	3.2	3.2	3.5	4.1	3.9	3.9	5.7	4.6	6.4	6.4	4.8	4.8	2.8	4.8	6.4
Miyazu	3.0	2.3	2.1	3.0	2.4	2.8	2.3	2.8	4.4	5.0	10.1	10.1	8.5	3.3	3.6	8.5	10.1
Nagoya	2.1	2.0	4.0	4.0	3.8	4.1	3.9	4.1	5.7	6.2	6.8	6.8	9.4	6.6	2.9	9.4	9.4
Hamamatsu	2.8	2.0	3.2	3.2	4.7	5.2	5.7	5.7	6.7	8.5	13.5	13.5	8.7	5.9	4.7	8.7	13.5

TABLE V - 21.

AVERAGE NUMBER OF DAYS WITH PRECIPITATION OF AT LEAST .004 INCHES

STATIONS	DEC	JAN	FEB	WIN	MAR	APR	MAY	SPR	JUN	JUL	AUG	SUM	SEP	OCT	NOV	AUT	YR
Kagoshima	13	14	14	41	16	15	14	45	19	17	15	51	15	12	11	38	175
Nagasaki	15	16	14	45	15	14	13	42	14	15	12	41	14	10	12	36	164
Fukuoka	16	17	15	48	16	14	12	42	15	14	11	40	15	12	13	40	170
Ōita	8	9	9	26	13	13	13	39	15	15	12	42	15	10	9	34	141
Shimonoseki	16	17	15	48	15	13	12	40	15	14	10	39	14	11	13	38	165
Hiroshima	10	12	10	32	14	12	12	38	14	13	10	37	14	10	10	34	141
Hamada	21	21	19	61	18	14	12	44	14	14	11	39	16	14	17	47	191
Ashizuri	11	8	11	30	12	12	15	39	16	16	15	47	19	12	11	42	156
Kōchi	7	8	9	24	13	14	4	41	17	17	15	49	17	11	10	38	152
Tokushima	10	10	10	30	13	13	3	39	16	13	11	40	15	12	11	38	146
Shiono-misaki	11	9	10	30	12	14	5	41	18	15	15	48	18	15	13	46	165
Kōbe	10	10	10	30	14	13	2	39	15	12	10	37	14	11	10	35	141
Ōsaka	9	9	10	28	13	13	3	39	15	13	10	38	14	11	10	35	140
Kyōto	13	14	13	40	16	14	3	43	16	14	12	42	16	12	12	40	165
Miyazu	25	25	22	72	22	15	4	51	15	14	13	42	19	18	20	57	222
Nagoya	10	10	9	29	12	13	2	37	15	15	12	42	16	12	10	38	146
Hamamatsu	8	8	8	24	12	14	3	39	15	14	12	41	16	13	10	39	144

TABLE V - 22.

AVERAGE NUMBER OF DAYS WITH PRECIPITATION OF AT LEAST .004 INCHES

STATIONS	DEC	JAN	FEB	WIN	MAR	APR	MAY	SPR	JUN	JUL	AUG	SUM	SEP	OCT	NOV	AUT	YR
Nagasaki	1	2	0	3	3	6	6	15	8	5	3	16	6	3	1	10	44
Fukuoka	2	2	1	5	3	7	3	13	8	7	3	18	5	3	0	8	44
Hiroshima	0	2	1	3	3	3	3	9	8	3	2	13	7	3	2	12	37
Tokushima	1	2	1	4	2	2	3	7	7	3	1	11	5	4	3	12	34
Kōbe	0	2	2	4	3	4	3	10	6	3	1	10	7	2	1	10	34
Ōsaka	1	3	1	5	3	5	4	12	7	1	2	10	7	3	2	12	39
Nagoya	0	3	1	4	3	7	4	14	6	5	5	16	9	4	3	16	50

TABLE V - 23.

AVERAGE NUMBER OF DAYS WITH SNOWFALL

STATIONS	NOV	DEC	JAN	FEB	MAR	APR	SEASON
Kagoshima	0	1	2	3	1	0	7
Nagasaki	*	3	6	5	2	0	16
Fukuoka	*	3	5	6	2	0	16
Ōita	*	2	4	4	1	0	10
Shimonoseki	*	2	5	6	2	0	15
Hiroshima	*	4	8	8	3	*	23
Hamada	*	5	10	10	5	*	30
Ashizuri	0	2	3	2	1	0	8
Kōchi	*	1	2	2	1	0	6
Tokushima	*	2	2	2	1	0	6
Shiono-misaki	0	1	2	1	1	0	5
Kōbe	*	3	7	8	4	*	22
Ōsaka	0	2	5	6	3	*	16
Kyōto	*	5	12	11	6	*	34
Miyazu	1	8	15	14	8	*	46
Nagoya	*	3	6	5	2	*	16
Hamamatsu	*	1	2	3	1	0	7

*Less than 0.5 day.

TABLE V - 24.

AVERAGE DATES OF FIRST AND LAST SNOWFALL

STATIONS	FIRST	LAST
Kagoshima	January 5	February 28
Nagasaki	December 20	March 3
Fukuoka	December 21	March 6
Ōita	December 19	March 3
Shimonoseki	December 25	March 7
Hiroshima	December 11	March 16
Hamada	December 11	March 18
Ashizuri	December 19	March 8
Kōchi	January 2	March 3
Tokushima	December 19	March 10
Shiono-misaki	January 6	February 21
Kōbe	December 18	March 17
Ōsaka	December 24	March 16
Kyōto	December 11	March 24
Miyazu	December 4	March 25
Nagoya	December 16	March 15
Hamamatsu	December 29	March 4

TABLE V - 25.

MEAN DAILY MAXIMUM TEMPERATURES, BY MONTHS AND SEASONS (° F.)

STATIONS	DEC	JAN	FEB	WIN	MAR	APR	MAY	SPR	JUN	JUL	AUG	SUM	SEP	OCT	NOV	AUT	YR
Kagoshima	56	53	54	54	60	68	74	67	78	85	87	83	83	75	66	75	70
Nagasaki	54	50	50	51	57	66	73	65	78	85	88	84	82	73	64	73	68
Fukuoka	53	49	49	50	56	65	73	65	79	86	88	84	81	72	63	72	68
Ōita	54	50	50	51	55	64	71	63	77	84	87	..	80	72	63	72	67
Shimonoseki	52	48	48	49	53	63	70	62	76	83	86	82	80	71	61	71	66
Hiroshima	52	48	48	49	54	64	71	63	78	85	88	84	82	72	62	72	67
Hamada	52	48	48	49	53	62	69	61	76	83	86	82	79	70	61	70	66
Ashizuri	58	53	54	55	59	66	72	66	76	83	85	81	81	73	66	73	69
Kōchi	57	53	54	55	59	68	74	67	78	85	88	84	83	75	65	74	70
Tokushima	54	49	50	51	55	65	73	64	79	86	89	85	82	72	63	72	68
Shiono-misaki	56	52	52	53	57	65	71	64	76	82	84	81	80	72	65	72	68
Kōbe	52	48	48	49	54	65	73	64	78	86	89	84	82	71	61	71	67
Ōsaka	52	48	48	49	55	66	73	65	80	86	90	85	83	72	62	72	68
Kyōto	52	48	49	50	55	66	74	65	80	87	90	86	83	72	62	72	68
Miyazu	51	46	46	48	52	63	70	62	77	85	87	83	80	69	60	70	65
Nagoya	51	47	49	49	55	66	73	65	79	86	89	85	82	72	62	72	68
Hamamatsu	53	49	50	51	55	65	71	64	77	83	86	82	80	71	62	71	67

TABLE V - 26.
MEAN DAILY MINIMUM TEMPERATURES, BY MONTHS AND SEASONS (° F.)

STATIONS	DEC	JAN	FEB	WIN	MAR	APR	MAY	SPR	JUN	JUL	AUG	SUM	SEP	OCT	NOV	AUT	YR
Kagoshima	40	37	38	38	43	52	58	51	66	73	74	71	69	59	49	59	55
Nagasaki	47	43	43	44	49	58	65	57	71	79	81	77	76	65	56	66	61
Fukuoka	37	34	34	35	38	45	53	45	63	72	73	69	65	52	44	54	51
Ōita	37	33	34	35	38	46	54	46	63	71	72	69	66	55	45	55	51
Shimonoseki	41	37	37	38	41	49	57	49	64	71	74	70	68	58	49	59	54
Hiroshima	35	32	32	33	37	46	53	45	63	71	73	69	66	54	43	54	50
Hamada	40	36	35	37	38	46	53	46	62	70	71	68	64	54	46	55	51
Ashizuri	44	39	40	41	45	54	62	54	67	74	76	72	72	62	53	62	57
Kōchi	37	34	35	35	40	50	56	49	65	71	72	69	67	56	46	56	52
Tokushima	38	34	34	35	38	48	56	47	64	72	73	70	68	57	46	57	52
Shiono-misaki	44	39	40	41	43	53	59	52	66	73	75	71	70	61	53	61	56
Kōbe	38	34	34	35	38	48	56	47	64	72	74	70	68	57	47	57	52
Ōsaka	36	32	32	33	37	47	55	46	64	72	74	70	67	54	43	55	51
Kyōto	31	28	38	32	33	42	50	42	61	69	70	67	64	50	39	51	47
Miyazu	36	32	33	34	35	44	51	43	61	70	71	67	64	53	43	53	49
Nagoya	34	30	31	32	36	46	54	45	63	71	73	69	66	53	42	54	50
Hamamatsu	38	34	35	36	39	49	56	48	64	71	72	69	67	57	47	57	52

TABLE V - 27.
EXTREME LOWEST TEMPERATURE, FOR EACH MONTH AND SEASON (°F.)

STATIONS	DEC	JAN	FEB	WIN	MAR	APR	MAY	SPR	JUN	JUL	AUG	SUM	SEP	OCT	NOV	AUT	YR
Kagoshima	22	22	20	20	26	30	41	26	48	61	62	48	51	37	29	29	20
Nagasaki	25	22	23	22	26	32	42	26	48	59	63	48	52	41	32	32	22
Fukuoka	22	21	17	17	24	29	35	24	40	57	61	40	46	33	28	28	17
Ōita	21	19	18	18	23	28	37	23	45	57	57	45	49	38	28	28	18
Shimonoseki	24	21	20	20	22	35	44	22	49	59	64	49	56	46	33	33	20
Hiroshima	17	17	17	17	19	29	37	19	44	58	57	44	48	37	27	27	17
Hamada	23	20	20	20	26	31	35	26	43	52	58	43	48	41	31	31	20
Ashizuri	30	24	26	24	30	39	51	30	57	67	68	57	61	48	38	38	24
Kōchi	20	20	19	19	24	31	41	24	48	58	62	48	53	38	29	29	19
Tokushima	24	22	24	22	26	31	40	26	49	60	63	49	53	40	30	30	22
Shiono-misaki	28	26	26	26	29	35	46	29	54	63	67	54	58	48	36	36	26
Kōbe	24	22	22	22	24	31	41	24	50	59	64	50	51	42	33	33	22
Ōsaka	25	19	20	19	24	31	39	24	48	59	63	48	52	38	28	28	19
Kyōto	15	11	11	11	17	24	31	17	41	51	55	41	46	32	24	24	11
Miyazu	22	16	13	13	15	28	35	15	43	51	58	43	48	36	30	30	13
Nagoya	19	13	15	13	20	29	37	20	47	57	58	47	49	35	27	27	13
Hamamatsu	24	21	22	21	26	33	40	26	51	60	62	51	55	39	32	32	21

TABLE V - 28.
EXTREME HIGHEST TEMPERATURE, FOR EACH MONTH AND SEASON (°F.)

STATIONS	DEC	JAN	FEB	WIN	MAR	APR	MAY	SPR	JUN	JUL	AUG	SUM	SEP	OCT	NOV	AUT	YR
Kagoshima	75	72	73	75	77	83	86	86	91	97	97	97	94	90	81	94	97
Nagasaki	75	70	73	75	74	82	85	85	94	96	98	98	94	87	81	94	98
Fukuoka	71	71	76	76	77	84	88	88	95	98	99	99	95	87	83	95	99
Ōita	73	76	75	76	78	87	85	87	93	97	97	97	95	85	78	95	97
Shimonoseki	69	66	65	69	72	81	84	84	90	96	97	97	92	85	78	92	97
Hiroshima	72	65	70	72	75	79	85	85	89	99	101	101	97	85	79	97	101
Hamada	73	74	72	74	76	83	86	86	92	97	98	98	97	84	80	97	98
Ashizuri	72	69	68	72	74	75	82	82	84	92	92	92	90	82	76	90	92
Kōchi	74	74	74	74	78	82	88	88	93	99	98	99	97	90	82	97	99
Tokushima	74	70	73	74	80	83	87	87	93	99	99	99	95	88	79	95	99
Shiono-misaki	71	68	70	71	71	75	82	82	85	96	93	96	89	82	78	89	96
Kōbe	72	67	66	72	75	83	86	86	93	97	100	100	94	84	79	94	100
Ōsaka	74	66	73	74	75	83	88	88	93	98	100	100	95	87	80	95	100
Kyōto	73	68	73	73	77	85	95	95	93	99	100	100	98	87	80	98	100
Miyazu	74	69	70	74	77	85	88	88	92	96	99	99	95	84	79	95	99
Nagoya	70	64	69	70	77	87	90	90	96	99	100	100	96	85	81	96	100
Hamamatsu	73	65	71	73	73	82	88	88	94	99	98	99	95	85	80	95	99

TABLE V - 29.

AVERAGE NUMBER OF DAYS WITH MAXIMUM AND MINIMUM TEMPERATURES WITHIN SPECIFIED RANGES

°F	Dec	Jan	Feb	Win	Mar	Apr	May	Spr	Jun	Jul	Aug	Sum	Sep	Oct	Nov	Aut	Yr
NAGASAKI																	
							Maximum										
30-39	1	4	2	7	0	0	0	0	0	0	0	0	*	0	0	*	7
40-49	8	13	13	35	4	0	0	4	0	0	0	0	0	0	1	1	40
50-59	15	12	10	37	17	5	0	21	0	0	0	0	0	1	9	9	68
60-69	6	3	3	11	9	17	8	34	1	0	0	1	*	10	18	29	75
70-79	*	0	0	*	1	8	22	30	18	6	1	24	13	19	3	34	89
80-89	0	0	0	0	0	*	2	2	11	21	22	53	16	2	0	18	73
90-99	0	0	0	0	0	0	0	0	0	4	9	13	1	0	0	1	14
							Minimum										
20-29	1	3	3	7	0	0	0	0	0	0	0	0	0	0	0	0	7
30-39	13	21	18	52	14	1	0	15	0	0	0	0	0	0	1	1	67
40-49	15	7	7	29	14	15	1	31	0	0	0	0	0	3	17	19	79
50-59	2	1	1	3	3	12	21	36	3	0	0	3	1	18	12	31	73
60-69	*	0	0	*	*	2	9	11	23	6	1	30	17	10	1	28	69
70-79	0	0	0	0	0	0	0	0	3	25	30	59	12	*	0	12	71
80-89	0	0	0	0	0	0	0	0	0	0	*	*	0	0	0	0	*
ŌSAKA																	
							Maximum										
30-39	*	1	1	2	*	0	0	*	0	0	0	0	0	0	0	0	3
40-49	8	18	18	44	8	*	0	9	0	*	0	*	0	0	*	*	53
50-59	20	12	8	40	16	7	*	23	0	0	0	0	0	*	10	10	72
60-69	3	*	1	4	6	17	8	31	*	0	0	*	*	9	17	27	62
70-79	*	0	*	*	1	6	22	29	14	3	0	17	9	19	3	31	77
80-89	0	0	0	0	0	0	2	2	16	16	10	41	16	2	0	18	61
90-99	0	0	0	0	0	0	0	0	0	12	21	32	6	0	0	6	39
							Minimum										
00-09	0	0	0	0	0	0	0	0	0	0	0	0	0	0	*	*	*
10-19	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
20-29	1	6	5	12	2	0	0	2	0	0	0	0	0	0	0	0	14
30-39	19	22	21	61	20	4	0	24	0	0	0	0	0	0	4	4	89
40-49	10	3	3	16	8	17	3	28	0	0	0	0	0	5	19	24	68
50-59	1	*	*	2	1	9	20	30	4	*	0	4	3	18	7	28	63
60-69	0	0	0	0	0	1	8	8	24	6	2	31	15	8	*	23	62
70-79	0	0	0	0	0	0	0	0	3	25	28	56	13	0	0	13	69
80-89	0	0	0	0	0	0	0	0	0	1	1	2	0	0	0	0	2

* Less than 0.5 day.

TABLE V - 30.

AVERAGE NUMBER OF DAYS WITH TEMPERATURES WITHIN SPECIFIED RANGES AT TIME OF OBSERVATION

°F	Dec	Jan	Feb	Win	Mar	Apr	May	Spr	Jun	Jul	Aug	Sum	Sep	Oct	Nov	Aut	Yr
KAGOSHIMA																	
							0600 L.C.T.										
0-9	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
10-19	0	*	0	*	0	0	0	0	0	0	0	0	0	0	0	0	*
20-29	1	4	3	7	1	*	0	1	0	0	0	0	0	0	0	0	8
30-39	13	17	14	43	12	3	0	15	0	0	0	0	0	1	5	5	63
40-49	10	6	7	24	8	9	2	19	0	0	0	0	0	5	11	16	59
50-59	7	4	4	15	8	11	13	32	2	0	0	2	3	13	10	26	76
60-69	1	*	*	1	2	7	14	22	14	1	1	16	10	10	4	24	64
70-79	0	0	0	0	*	1	2	3	14	28	26	67	17	3	*	20	89
80-89	0	0	0	0	0	0	*	*	0	2	4	7	1	0	0	1	7
90-99	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
							1800 L.C.T.										
0-9	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
10-19	0	*	0	*	0	0	0	0	0	0	0	0	0	0	0	0	*
20-29	0	*	0	*	0	0	0	0	0	0	0	0	0	0	0	0	*
30-39	1	6	3	10	1	0	0	1	0	0	0	0	0	0	0	0	11
40-49	11	15	12	38	5	*	0	5	0	0	0	0	0	0	2	2	45
50-59	15	9	11	36	18	7	1	26	0	0	0	0	0	3	17	20	82
60-69	4	1	2	7	6	18	10	35	2	0	0	2	1	15	10	26	70
70-79	0	0	0	0	*	4	20	25	23	5	2	31	17	13	1	31	86
80-89	0	0	0	0	0	0	*	*	5	23	28	56	12	*	0	12	69
90-99	0	0	0	0	0	0	0	0	0	3	1	3	0	0	0	0	3

* Less than 0.5 day

TABLE V-30. (*Continued*).
AVERAGE NUMBER OF DAYS WITH TEMPERATURES WITHIN SPECIFIED RANGES AT TIME OF OBSERVATION

°F	DEC	JAN	FEB	WIN	MAR	APR	MAY	SPR	JUN	JUL	AUG	SUM	SEP	OCT	NOV	AUT	YR
NAGASAKI																	
							0600 L.C.T.										
0-9	0	*	0	*	0	0	0	0	0	0	0	0	0	0	0	0	*
10-19	0	0	0	0	0	0	*	*	0	0	0	0	0	0	0	0	*
20-29	*	1	1	3	*	0	0	*	0	0	0	0	0	0	0	0	3
30-39	8	19	17	44	10	*	0	11	0	0	0	0	*	0	*	1	55
40-49	15	9	8	31	14	10	*	24	0	0	0	0	0	1	10	12	67
50-59	7	2	3	12	6	15	16	38	1	0	0	1	1	16	17	34	83
60-69	1	*	*	1	1	4	14	19	20	2	*	23	16	13	3	31	74
70-79	0	0	0	0	0	*	1	1	9	28	30	67	14	1	0	15	83
80-89	0	0	0	0	0	0	0	0	0	1	1	2	0	0	0	0	2
							1800 L.C.T.										
20-29	0	1	0	1	0	0	0	0	0	0	0	0	*	0	0	*	1
30-39	3	12	9	24	3	0	0	3	0	0	0	0	0	0	*	*	3
40-49	15	14	14	4	11	1	0	12	0	0	0	0	0	*	3	3	6
50-59	12	4	5	21	15	16	2	32	0	0	0	0	0	5	20	25	8
60-69	2	*	*	2	2	12	19	33	5	*	0	6	4	21	6	31	8
70-79	0	0	0	0	0	1	11	12	24	10	7	42	22	5	0	27	80
80-89	0	0	0	0	0	0	0	0	1	20	24	44	4	0	0	4	49
90-99	0	0	0	0	0	0	0	0	0	*	*	*	0	0	0	0	*
FUKUOKA																	
							0600 L.C.T.										
0-9	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
10-19	*	*	0	*	*	0	0	*	0	0	0	0	0	0	0	0	1
20-29	0	2	2	4	1	0	0	1	0	0	0	0	0	0	0	0	5
30-39	13	21	18	53	15	5	*	21	0	0	0	0	0	1	6	7	80
40-49	13	6	6	25	10	9	4	23	0	0	0	0	*	9	13	22	70
50-59	5	2	2	8	4	13	17	33	6	0	0	6	6	15	10	30	77
60-69	*	0	*	1	*	3	9	13	17	2	3	22	13	6	2	21	55
70-79	0	0	*	*	0	*	1	1	7	28	27	62	11	*	*	12	74
80-89	0	0	0	0	0	0	0	0	1	1	1	3	0	0	0	0	3
							1800 L.C.T.										
0-9	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
10-19	*	0	0	*	0	0	0	0	0	0	0	0	0	0	0	0	*
20-29	0	*	0	*	0	0	0	0	*	0	0	*	0	0	0	0	1
30-39	2	12	8	23	3	*	0	3	0	0	0	0	0	0	*	*	26
40-49	17	15	15	47	13	1	0	14	0	0	0	0	0	*	4	4	64
50-59	11	3	5	19	14	16	1	32	0	0	0	0	0	7	21	28	79
60-69	1	*	*	1	2	10	17	28	3	*	0	4	5	20	5	30	63
70-79	0	0	0	0	*	2	13	15	22	9	6	37	20	4	0	23	76
80-89	0	0	0	0	0	0	0	0	4	21	24	49	5	*	0	5	54
90-99	0	0	0	0	0	0	0	0	0	2	*	2	0	0	0	0	2
SHIMONOSEKI																	
							0600 L.C.T.										
0-9	0	*	0	*	0	0	0	0	0	0	0	0	0	0	0	0	*
10-19	0	0	0	0	0	0	0	0	0	0	0	0	0	0	*	*	*
20-29	*	1	1	2	0	0	0	0	0	0	0	0	0	0	0	0	2
30-39	5	18	17	40	10	1	0	11	0	0	0	0	0	0	*	*	51
40-49	19	11	9	39	17	10	1	27	0	0	0	0	0	1	10	11	77
50-59	7	13	2	10	4	18	18	40	1	0	0	1	1	17	18	36	87
60-69	*	0	0	*	0	2	12	14	22	3	1	25	14	13	2	28	67
70-79	0	0	0	0	0	*	*	*	7	27	29	63	15	1	0	16	79
80-89	*	0	0	*	0	0	0	0	0	1	2	3	*	0	0	*	3
							1800 L.C.T.										
0-9	0	0	0	0	*	0	0	*	0	0	0	0	0	0	0	0	*
10-19	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
20-29	0	1	*	1	0	0	0	0	0	0	0	0	0	0	0	0	1
30-39	2	12	10	23	3	*	0	3	0	0	0	0	0	0	*	*	27
40-49	16	16	15	48	15	2	0	17	0	0	0	0	0	0	3	3	67
50-59	12	3	3	18	12	19	3	33	0	0	0	0	0	6	22	28	79
60-69	1	0	0	1	1	9	21	31	5	1	0	6	3	20	5	29	66
70-79	0	0	0	0	0	*	7	8	24	12	8	44	22	5	0	27	79
80-89	0	0	0	0	0	0	0	0	1	18	22	41	4	0	0	4	45
90-99	0	0	0	0	0	0	0	0	0	*	1	1	0	0	0	0	2
ŌITA																	
							0600 L.C.T.										
0-9	0	*	*	*	0	0	0	0	0	0	0	0	0	0	0	0	*
10-19	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
20-29	1	4	4	9	2	0	0	2	0	0	0	0	0	0	0	0	11
30-39	13	18	15	46	14	5	*	20	*	0	0	*	*	*	5	6	71
40-49	12	7	8	27	10	10	5	25	0	0	0	0	*	8	13	21	73
50-59	5	1	2	8	4	13	16	33	5	0	0	5	5	13	10	28	73
60-69	*	0	*	*	*	2	10	13	18	2	3	23	13	9	2	24	60
70-79	0	0	0	0	0	*	*	*	7	28	28	63	12	*	0	13	76
80-89	0	0	0	0	0	0	0	0	*	1	*	1	*	0	0	*	1

* Less than 0.5 day

TABLE V - 30. (*Continued*).

AVERAGE NUMBER OF DAYS WITH TEMPERATURES WITHIN SPECIFIED RANGES AT TIME OF OBSERVATION

°F	DEC	JAN	FEB	WIN	MAR	APR	MAY	SPR	JUN	JUL	AUG	SUM	SEP	OCT	NOV	AUT	YR
							1800 L.C.T.										
0-9	0	0	0	0	0	0	0	0	0	0	0	0	0	*	0	*	*
10-19	0	0	0	0	0	0	0	0	0	0	0	0	*	0	0	0	0
20-29	0	1	*	1	0	0	0	0	0	0	0	0	0	0	0	*	1
30-39	1	9	6	18	2	0	0	2	0	0	0	0	0	0	0	0	20
40-49	16	17	17	50	12	1	0	13	0	0	0	0	0	0	0	3	65
50-59	13	4	4	21	16	16	2	34	0	0	0	0	0	6	21	26	81
60-69	1	*	*	2	1	12	17	29	4	1	0	4	4	20	7	31	66
70-79	0	0	0	0	*	2	12	14	24	9	7	40	21	5	*	26	80
80-89	0	0	0	0	0	0	0	0	2	20	24	47	6	0	0	6	52
90-99	0	0	0	0	0	0	0	0	*	1	*	1	0	0	0	0	1
HIROSHIMA																	
							0600 L.C.T.										
0-9	*	*	*	1	0	*	0	*	0	0	0	0	0	0	0	0	1
10-19	0	*	0	*	0	0	0	0	0	0	0	0	0	0	0	0	*
20-29	1	5	6	12	2	0	0	2	0	0	0	0	0	0	0	0	15
30-39	18	21	18	58	17	5	*	23	0	0	0	0	0	*	7	7	88
40-49	9	4	3	16	8	12	4	25	*	0	0	*	*	7	15	22	62
50-59	3	*	1	3	3	11	18	32	5	0	0	5	5	17	7	29	69
60-69	*	0	0	*	0	2	9	10	19	3	2	24	15	6	1	22	56
70-79	0	0	0	0	0	0	*	*	6	27	28	61	11	0	0	11	72
80-89	0	0	0	0	0	0	0	0	0	1	1	2	*	1	0	1	3
							1800 L.C.T.										
0-9	0	0	*	*	0	0	0	0	0	0	0	0	0	0	0	0	*
10-19	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	**0**
20-29	0	1	*	1	0	0	0	0	0	0	0	0	0	0	0	0	**1**
30-39	3	13	8	24	3	0	0	3	0	0	0	0	0	*	*	*	**27**
40-49	16	15	17	48	12	1	0	14	0	0	0	0	0	*	3	3	**64**
50-59	11	2	3	17	14	16	2	42	0	0	0	0	0	4	21	25	**84**
60-69	*	0	*	*	2	12	16	19	3	*	0	3	2	20	6	27	**50**
70-79	0	0	0	0	0	1	13	14	25	9	4	38	20	7	0	27	**79**
80-89	0	0	0	0	0	0	0	0	3	20	26	48	8	0	0	8	**56**
90-99	0	0	0	0	0	0	0	0	*	2	1	3	0	0	0	0	3
HAMADA																	
							0600 L.C.T.										
0-9	*	0	0	*	0	0	0	0	0	0	0	0	0	0	0	0	*
10-19	0	0	0	0	0	0	0	0	*	0	0	*	0	0	0	0	*
20-29	*	1	*	2	1	0	0	1	0	0	0	0	0	0	0	0	2
30-39	8	19	19	46	14	4	0	18	*	0	0	*	0	*	1	1	65
40-49	16	9	7	33	12	11	3	25	0	0	0	0	0	5	12	17	75
50-59	6	2	1	10	4	12	18	34	5	*	*	5	5	18	15	38	87
60-69	*	*	*	1	*	2	9	12	19	4	4	26	14	9	2	24	63
70-79	0	0	0	0	0	1	1	2	6	24	23	53	11	*	0	11	65
80-89	*	0	0	*	0	*	0	*	*	4	4	8	*	0	0	*	9
							1800 L.C.T.										
0-9	0	0	*	*	0	0	0	0	0	0	0	0	0	0	0	0	*
10-19	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
20-29	0	1	*	1	1	0	0	1	0	0	0	0	0	0	0	0	2
30-39	2	13	11	26	5	*	0	5	0	0	0	0	0	0	0	0	30
40-49	18	15	14	46	14	3	0	17	0	0	0	0	0	*	4	5	68
50-59	11	2	3	16	11	19	4	34	0	0	0	0	0	10	21	31	80
60-69	1	*	*	1	*	7	20	27	8	1	0	8	5	19	4	28	64
70-79	0	*	0	*	*	1	7	8	21	13	9	43	22	3	*	25	76
80-89	0	0	0	0	0	0	0	0	2	17	21	39	4	0	0	4	44
90-99	0	0	0	0	0	0	0	0	0	1	1	2	0	0	0	0	2
SHIMIZU																	
							0600 L.C.T.										
0-9	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	1
10-19	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
20-29	0	1	1	2	1	0	0	1	0	0	0	0	0	0	0	0	3
30-39	8	17	15	40	10	1	0	11	0	0	0	0	*	0	2	3	53
40-49	14	8	8	30	10	8	1	19	0	0	0	0	0	2	10	12	61
50-59	8	4	4	16	9	12	11	33	1	0	0	1	1	13	12	26	75
60-69	2	*	*	2	2	8	16	25	14	1	*	16	11	12	6	29	72
70-79	0	0	0	0	0	1	3	3	15	26	24	64	17	4	0	21	88
80-89	0	0	0	0	0	0	*	*	*	4	7	11	2	0	0	2	13
							1800 L.C.T.										
30-39	1	7	3	11	1	0	0	1	0	0	0	0	0	0	*	*	12
40-49	14	16	15	44	6	0	0	6	0	0	0	0	0	0	3	3	53
50-59	13	7	10	31	19	9	*	28	0	0	0	0	0	5	16	20	79
60-69	3	1	1	5	5	19	12	36	2	*	0	2	1	17	10	28	71
70-79	*	0	0	*	0	2	19	21	25	8	4	36	18	9	1	28	86
80-89	0	0	0	0	0	0	0	0	4	22	27	55	11	*	0	11	65
90-99	0	0	0	0	0	0	0	0	0	1	0	1	0	0	0	0	1

* Less than 0.5 day

TABLE V - 30. (*Continued*).
AVERAGE NUMBER OF DAYS WITH TEMPERATURES WITHIN SPECIFIED RANGES AT TIME OF OBSERVATION

°F	DEC	JAN	FEB	WIN	MAR	APR	MAY	SPR	JUN	JUL	AUG	SUM	SEP	OCT	NOV	AUT	YR
KŌCHI																	
0600 L.C.T.																	
0-9	0	*	0	*	0	0	0	0	0	0	0	0	0	0	0	0	*
10-19	0	*	0	*	0	0	0	0	0	0	0	0	0	0	0	0	*
20-29	1	7	6	13	2	0	0	2	0	0	0	0	0	0	0	0	16
30-39	15	17	15	47	13	2	0	15	0	0	0	0	0	*	5	5	67
40-49	11	6	6	23	10	10	2	22	0	0	0	0	0	4	12	16	60
50-59	5	1	2	7	5	14	17	37	2	0	*	2	4	17	11	32	78
60-69	*	0	0	*	*	4	12	16	21	2	1	24	14	9	2	24	65
70-79	0	0	0	0	0	0	*	*	7	28	29	65	13	1	0	13	78
80-89	0	0	0	0	0	0	0	0	0	*	*	1	*	0	0	*	1
1800 L.C.T.																	
10-19	0	0	0	0	0	0	0	0	0	0	*	*	0	0	0	0	*
20-29	0	*	0	*	0	0	0	0	0	0	0	0	0	0	0	0	*
30-39	2	9	5	16	1	0	0	1	0	0	0	0	0	0	0	0	17
40-49	13	16	16	45	9	1	0	9	0	0	0	0	0	0	2	2	56
50-59	14	6	7	27	17	11	1	28	0	0	0	0	0	4	20	25	79
60-69	2	*	1	2	4	17	16	37	3	*	0	3	3	19	7	29	72
70-79	0	0	0	0	*	2	15	16	25	11	6	42	20	8	*	28	87
80-89	0	0	0	0	0	0	*	*	2	20	25	46	7	0	0	7	53
90-99	0	0	0	0	0	0	0	0	0	*	*	1	0	0	0	0	1
TOKUSHIMA																	
0600 L.C.T.																	
0-9	0	*	0	*	0	0	0	0	0	0	0	0	0	0	0	0	*
10-19	0	*	0	*	0	0	0	0	0	0	0	0	0	0	0	0	*
20-29	0	2	2	4	1	0	0	1	0	0	0	0	*	0	0	*	4
30-39	13	20	21	54	17	3	0	19	0	0	0	0	0	0	2	2	75
40-49	14	7	4	26	10	12	2	24	0	0	0	0	0	2	14	17	67
50-59	3	1	1	5	3	12	16	32	2	0	0	2	1	18	13	32	71
60-69	1	0	*	1	1	3	12	16	19	2	1	22	15	10	1	27	65
70-79	0	0	0	0	0	*	1	1	9	29	29	67	13	1	0	14	81
80-89	0	0	0	0	0	0	0	0	0	1	1	1	*	0	0	*	2
SHIONO-MISAKI																	
0600 L.C.T.																	
0-9	0	0	0	0	*	0	0	*	0	0	0	0	0	0	0	0	*
10-19	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
20-29	0	0	*	*	*	*	0	*	0	0	0	0	0	0	*	*	1
30-39	3	1	14	18	7	*	0	7	0	0	0	0	0	0	5	5	29
40-49	16	14	10	39	13	5	*	18	0	0	0	0	0	0	19	19	76
50-59	11	12	4	27	10	17	7	34	19	1	0	20	*	8	6	14	95
60-69	2	4	*	6	1	8	22	31	11	28	0	39	10	19	1	30	106
70-79	0	*	0	*	0	*	2	2	*	2	29	30	20	3	0	23	56
80-89	0	0	0	0	0	0	0	0	0	0	2	2	*	0	0	*	3
1800 L.C.T.																	
20-29	0	*	0	*	0	0	0	0	0	0	0	0	0	0	0	0	*
30-39	1	7	5	13	2	0	0	2	0	0	0	0	*	0	0	*	14
40-49	11	16	16	43	10	1	0	10	0	0	0	0	0	*	1	1	54
50-59	16	7	7	31	17	14	1	32	0	0	0	0	0	3	17	19	82
60-69	3	1	*	4	3	15	22	39	7	1	0	7	3	21	12	36	86
70-79	*	0	0	*	0	*	8	8	23	18	13	54	23	8	1	31	94
80-89	0	0	0	0	0	0	0	0	*	13	18	31	4	0	0	4	35
90-99	0	0	0	0	0	0	0	0	0	*	0	*	0	0	0	0	*
KŌBE																	
0600 L.C.T.																	
0-9	0	*	0	*	0	0	0	0	0	0	0	0	0	0	0	0	*
10-19	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
20-29	0	4	3	7	1	0	0	1	0	0	0	0	0	0	0	0	8
30-39	14	21	20	56	17	3	0	19	*	0	0	*	0	0	1	1	77
40-49	13	5	4	22	9	11	1	21	0	0	0	0	0	2	14	16	59
50-59	3	1	1	5	4	14	15	33	1	0	0	1	2	17	13	32	71
60-69	*	0	0	*	*	3	14	17	19	2	1	22	13	12	1	26	65
70-79	0	0	0	0	0	0	*	*	9	27	28	65	15	1	0	16	81
80-89	0	0	0	0	0	0	0	0	0	2	2	4	*	0	0	*	4
90-99	0	0	0	0	0	0	0	0	0	0	0	0	*	0	0	*	*
ŌSAKA																	
0600 L.C.T.																	
0-9	0	*	0	*	0	0	0	0	0	0	0	0	0	0	0	0	*
10-19	0	0	0	0	0	0	0	0	*	0	0	*	*	0	0	*	*
20-29	*	4	3	7	2	0	0	2	0	0	0	0	0	0	0	0	9
30-39	15	21	21	58	17	3	0	20	0	0	0	0	0	*	5	5	83
40-49	13	5	4	21	9	11	2	21	0	0	0	0	0	4	13	17	59
50-59	3	1	1	4	4	14	15	33	2	0	0	2	3	16	11	30	69
60-69	0	0	0	0	*	2	14	16	20	2	1	22	13	10	2	24	62
70-79	0	0	0	0	0	0	*	*	8	27	29	64	14	1	0	15	79
80-89	0	0	0	0	0	0	0	0	*	3	2	4	*	0	0	*	4

* Less than 0.5 day

TABLE V-30. (*Continued*).
AVERAGE NUMBER OF DAYS WITH TEMPERATURES WITHIN SPECIFIED RANGES AT TIME OF OBSERVATION

°F	DEC	JAN	FEB	WIN	MAR	APR	MAY	SPR	JUN	JUL	AUG	SUM	SEP	OCT	NOV	AUT	YR
ŌSAKA																	
							1800 L.C.T.										
0-9	*	0	0	*	0	0	0	0	0	0	0	0	0	0	0	0	*
10-19	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
20-29	0	*	0	*	0	0	*	*	*	0	0	*	0	0	0	0	1
30-39	2	12	10	24	3	0	0	3	0	0	0	0	0	0	0	0	27
40-49	19	16	16	51	14	2	0	16	0	0	*	*	0	0	2	2	69
50-59	10	2	2	15	13	16	2	30	0	0	0	0	0	5	22	27	72
60-69	1	0	0	1	1	12	17	29	2	*	0	2	3	19	6	28	60
70-79	0	0	0	0	0	1	13	13	25	8	3	35	18	7	0	25	73
80-89	0	0	0	0	0	0	0	0	3	19	26	48	9	0	0	9	58
90-99	0	0	0	0	0	0	0	0	*	4	2	6	0	0	0	0	6
KYŌTO																	
							0600 L.C.T.										
0-9	0	*	*	1	0	0	0	0	0	0	0	0	0	0	0	0	1
10-19	0	*	11	11	0	0	0	0	0	0	0	0	*	0	0	*	11
20-29	3	11	14	28	7	0	0	7	0	0	0	0	0	0	0	0	35
30-39	19	17	2	38	16	8	1	25	0	0	0	0	0	1	11	12	75
40-49	8	2	1	10	6	11	4	21	0	0	0	0	*	9	11	19	51
50-59	1	*	0	2	2	10	18	30	6	0	*	6	7	15	7	29	67
60-69	*	0	0	*	0	2	8	10	18	4	4	25	13	6	1	19	55
70-79	0	0	0	0	0	0	*	*	7	27	27	60	10	*	0	10	70
80-89	0	0	0	0	0	0	0	0	0	*	1	1	0	0	0	0	1
90-99	0	0	0	0	0	0	0	0	0	0	0	0	0	0	*	*	*
MIYAZU																	
							0600 L.C.T.										
0-9	0	*	0	*	0	0	0	0	0	0	0	0	0	0	0	0	*
10-19	0	0	*	*	*	0	0	*	0	0	0	0	0	0	0	0	*
20-29	*	4	4	8	3	0	0	3	0	0	0	0	0	0	*	*	20
30-39	15	21	21	57	18	7	*	26	0	0	0	0	0	*	4	4	86
40-49	13	5	4	21	7	10	4	22	0	0	0	0	0	6	14	20	62
50-59	3	1	*	4	3	9	17	29	7	*	0	7	5	18	11	33	74
60-69	*	0	*	*	*	3	9	12	16	5	3	23	14	7	1	23	58
70-79	0	0	0	0	0	*	1	1	7	24	25	56	10	1	0	11	68
80-89	0	0	0	0	0	0	0	0	*	3	3	6	*	0	0	*	6
							1800 L.C.T.										
0-9	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
10-19	0	0	*	*	0	0	0	0	0	0	0	0	0	0	0	0	*
20-29	0	2	1	3	*	0	0	*	0	0	0	0	0	0	0	0	3
30-39	8	19	19	46	9	*	0	9	0	0	0	0	0	*	1	1	56
40-49	17	8	8	33	15	7	*	22	0	0	0	0	0	*	8	8	63
50-59	6	2	1	8	6	15	7	28	*	0	0	*	0	12	19	30	67
60-69	1	*	*	1	1	7	17	25	7	*	0	7	7	17	3	27	60
70-79	*	0	0	*	0	1	7	8	21	14	10	45	19	2	0	20	74
80-89	0	0	0	0	0	0	*	*	2	16	20	38	5	0	0	5	62
90-99	0	0	0	0	0	0	0	0	0	1	1	2	0	0	0	0	2
NAGOYA																	
							0600 L.C.T.										
0-9	0	*	0	*	0	*	0	*	0	0	0	0	0	0	0	0	1
10-19	0	*	*	1	0	0	0	0	0	0	0	0	0	0	0	0	1
20-29	2	11	11	25	6	0	0	6	0	0	0	0	0	0	0	0	31
30-39	21	17	14	52	17	6	*	22	*	0	0	*	0	1	10	11	86
40-49	6	2	2	10	7	12	4	22	0	0	0	0	5	6	13	25	57
50-59	1	*	*	2	2	11	19	32	4	0	2	7	14	19	7	39	80
60-69	*	0	0	*	*	1	8	9	21	4	29	54	11	5	*	16	79
70-79	0	0	0	0	0	0	*	*	5	27	0	32	0	0	0	0	32
80-89	0	0	0	0	0	0	0	0	0	*	0	*	0	0	0	0	*
							1800 L.C.T.										
20-29	0	1	1	2	0	0	0	0	0	0	0	0	0	0	0	0	2
30-39	8	18	16	42	7	*	0	7	0	0	0	0	0	0	*	*	49
40-49	18	10	10	38	14	3	0	16	0	0	0	0	0	*	9	9	63
50-59	6	1	2	8	10	17	3	30	0	0	0	0	0	9	19	28	66
60-69	1	0	0	1	1	10	20	30	4	1	*	5	7	20	2	29	65
70-79	0	0	0	0	0	1	8	9	24	12	10	46	18	2	0	20	74
80-89	0	0	0	0	0	0	0	0	2	16	21	29	4	0	0	4	43
90-99	0	0	0	0	0	0	0	0	0	2	*	2	0	0	0	0	2
HAMAMATSU																	
							0600 L.C.T.										
0-9	0	*	0	*	0	0	0	0	0	0	0	0	0	0	0	0	*
10-19	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
20-29	0	3	2	5	1	0	0	1	0	0	0	0	0	0	1	1	6
30-39	13	20	20	53	14	1	0	15	0	0	0	0	0	0	13	13	82
40-49	14	7	5	26	12	10	*	23	0	0	0	0	*	1	15	16	64
50-59	4	1	1	6	4	16	16	37	1	3	1	4	1	18	1	20	67
60-69	*	0	0	*	*	3	14	17	23	27	30	81	15	11	0	26	124
70-79	0	0	0	0	0	0	*	*	6	1	*	7	14	1	0	15	22
80-89	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

* Less than 0.5 day

TABLE V - 30. (*Continued*).
AVERAGE NUMBER OF DAYS WITH TEMPERATURES WITHIN SPECIFIED RANGES AT TIME OF OBSERVATION

°F	DEC	JAN	FEB	WIN	MAR	APR	MAY	SPR	JUN	JUL	AUG	SUM	SEP	OCT	NOV	AUT	YR
HAMAMATSU																	
								1800 L.C.T.									
0-9	0	0	0	0	0	0	※	※	0	0	0	0	0	0	0	0	※
10-19	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
20-29	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	1
30-39	2	12	10	24	3	0	0	3	0	0	0	0	0	0	0	0	27
40-49	18	15	15	48	12	1	0	13	0	0	0	0	0	※	3	3	64
50-59	10	4	3	16	15	16	2	33	0	0	※	※	0	5	22	27	77
60-69	1	※	※	1	1	12	23	36	5	1	0	5	5	22	5	32	75
70-79	0	0	0	0	0	※	6	6	25	17	9	50	22	4	※	26	82
80-89	0	0	0	0	0	0	0	0	1	13	22	36	4	0	0	4	39
90-99	0	0	0	0	0	0	0	0	0	1	0	1	0	0	0	0	1

※ Less than 0.5 day

TABLE V - 31.
MEAN DAILY RELATIVE HUMIDITY (%)

STATIONS	DEC	JAN	FEB	WIN	MAR	APR	MAY	SPR	JUN	JUL	AUG	SUM	SEP	OCT	NOV	AUT	YR
Kagoshima	73	72	72	72	73	76	77	75	83	83	80	82	79	74	74	76	77
Nagasaki	69	69	68	69	69	72	74	72	82	82	77	80	76	69	69	71	73
Fukuoka	74	73	73	73	74	77	78	76	82	81	82	82	83	80	77	80	78
Ōita	72	72	73	72	75	79	80	78	85	84	83	84	84	79	77	80	79
Shimonoseki	69	70	70	70	71	75	78	75	84	84	81	83	79	74	72	75	75
Hiroshima	73	72	70	72	70	71	73	71	78	79	76	78	76	73	74	74	74
Hamada	65	66	66	66	68	72	75	72	80	81	80	80	80	75	69	75	73
Ashizuri	66	63	64	64	65	71	78	71	84	87	83	85	81	71	68	73	73
Kōchi	70	68	66	68	69	74	77	73	84	85	83	84	82	76	75	78	76
Tokushima	69	68	68	68	71	73	72	72	80	81	79	80	82	75	73	77	74
Shiono-misaki	66	63	66	65	68	77	81	75	87	89	88	88	84	77	71	77	76
Kōbe	68	68	66	67	67	69	70	69	77	78	74	76	75	72	70	72	71
Ōsaka	71	71	70	71	70	72	73	72	77	77	77	77	74	76	75	75	74
Kyōto	79	78	75	77	73	73	73	73	78	79	78	78	81	81	81	81	77
Miyazu	81	81	80	81	78	76	78	77	81	81	81	81	84	84	81	83	80
Nagoya	76	75	71	74	69	72	73	71	78	79	78	78	81	78	76	78	75
Hamamatsu	67	65	63	65	66	74	77	72	83	85	83	84	83	77	72	77	75

TABLE V - 32.
AVERAGE NUMBER OF DAYS WITH RELATIVE HUMIDITY
WITHIN SPECIFIED RANGES

°F	DEC	JAN	FEB	WIN	MAR	APR	MAY	SPR	JUN	JUL	AUG	SUM	SEP	OCT	NOV	AUT	YR
Nagasaki																	
								0600 L.C.T.									
<20	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
20-80	19	22	18	59	21	15	10	46	7	2	6	15	10	21	20	51	171
>80	12	9	10	31	10	15	21	46	23	29	25	77	20	10	10	40	194
								1800 L.C.T.									
<20	※	0	0	※	0	0	0	0	0	0	0	0	0	0	0	0	※
20-80	31	31	28	90	31	30	31	92	30	31	31	92	30	31	30	91	365
>80	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Ōsaka																	
								0600 L.C.T.									
<20	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
20-80	12	15	15	42	13	10	8	31	7	3	4	14	4	6	8	18	105
>80	19	16	13	48	18	20	21	61	23	28	27	78	26	25	22	73	260
								1800 L.C.T.									
<20	0	0	0	0	0	0	0	0	0	0	※	※	0	0	0	0	0
20-80	25	26	24	75	28	24	26	78	23	22	24	69	22	23	24	69	291
>80	6	5	4	15	3	6	5	14	7	9	7	23	8	8	6	22	74

※ Less than 0.5 day

TABLE V - 33.
SURFACE WIND FREQUENCIES (%)

	N	NE	E	SE	S	SW	W	NW	C
KAGOSHIMA									
Jan	29	11	5	3	2	2	10	38	0
Feb	19	13	13	11	2	2	8	32	0
Mar	16	14	13	6	5	3	10	34	0
Apr	11	13	11	9	10	5	13	27	1
May	10	12	13	10	10	5	13	26	1
Jun	6	11	9	12	15	13	16	16	2
Jul	6	11	9	13	17	9	15	19	1
Aug	7	17	15	11	10	6	12	20	2
Sep	9	19	16	10	8	5	10	22	1
Oct	16	22	11	6	4	3	8	30	0
Nov	22	19	8	4	3	1	8	34	1
Dec	26	13	5	2	1	2	11	40	0
Ann	15	15	10	8	7	5	11	28	1
NAGASAKI									
Jan	37	15	8	9	2	2	4	18	5
Feb	36	15	8	7	2	3	5	19	5
Mar	30	14	8	10	4	6	8	16	4
Apr	22	10	9	13	7	13	10	11	5
May	15	8	7	13	8	19	15	8	7
Jun	9	6	7	14	10	28	14	5	7
Jul	7	5	6	15	12	21	13	3	8
Aug	10	9	10	16	10	22	12	4	7
Sep	20	20	11	12	7	10	8	7	5
Oct	27	25	12	9	2	4	4	10	7
Nov	31	18	11	9	2	2	4	15	8
Dec	37	15	9	8	2	2	4	18	5
Ann	23	13	9	11	6	12	9	11	6
FUKUOKA									
Jan	13	6	6	26	16	4	12	14	3
Feb	16	8	7	19	16	3	12	16	3
Mar	21	10	7	18	14	4	10	14	2
Apr	23	9	6	19	13	4	9	12	5
May	21	7	6	22	13	4	8	13	6
Jun	19	7	6	25	15	4	6	11	7
Jul	18	7	7	24	19	5	6	8	6
Aug	19	10	11	24	14	3	5	7	7
Sep	20	17	10	21	12	3	4	6	7
Oct	20	15	10	23	12	4	5	6	5
Nov	15	10	10	26	15	4	9	10	1
Dec	14	5	5	26	17	4	12	16	1
Ann	18	9	8	24	14	4	8	11	4
SHIMONOSEKI									
Jan	5	5	27	4	2	6	25	24	2
Feb	6	6	31	4	1	5	21	24	2
Mar	6	6	36	5	1	4	19	21	2
Apr	4	5	41	5	1	4	18	19	3
May	3	4	41	5	1	4	20	20	2
Jun	2	3	45	6	1	4	17	19	3
Jul	2	4	48	6	2	5	14	16	3
Aug	3	5	46	8	2	5	13	14	4
Sep	6	10	43	7	2	4	10	14	4
Oct	9	11	36	6	1	5	12	16	4
Nov	7	7	33	6	2	6	18	18	3
Dec	5	5	26	4	1	7	23	27	2
Ann	5	6	38	5	1	5	18	19	3
HIROSHIMA									
Jan	37	24	2	1	4	7	11	8	6
Feb	35	26	3	1	4	9	9	7	6
Mar	34	25	3	2	6	12	7	5	6
Apr	29	20	2	2	8	19	8	4	8
May	28	17	2	1	10	23	8	4	7
Jun	21	13	2	1	13	29	8	3	10
Jul	18	12	2	2	15	30	8	3	10
Aug	23	17	3	2	12	26	7	3	7
Sep	33	27	4	2	7	14	4	3	6
Oct	43	33	3	1	4	7	3	3	3
Nov	41	29	3	1	4	7	6	5	4
Dec	39	25	2	1	3	6	11	8	5
Ann	32	22	3	1	8	16	7	5	6
TOKUSHIMA									
Jan	12	4	1	2	2	3	25	45	6
Feb	14	4	2	2	2	3	25	44	4
Mar	17	4	3	6	5	2	18	39	6
Apr	14	5	5	12	13	2	11	30	8
May	10	5	7	18	14	2	9	26	9

TABLE V - 33 (Continued).

	N	NE	E	SE	S	SW	W	NW	C
Jun	8	5	7	21	15	3	7	20	14
Jul	9	5	9	22	15	2	7	18	13
Aug	8	5	6	20	16	3	10	21	11
Sep	10	3	5	11	12	3	14	31	11
Oct	11	3	2	3	4	2	24	43	8
Nov	11	3	1	4	4	2	26	42	7
Dec	9	2	1	2	2	3	33	42	6
Ann	11	4	4	10	9	2	17	34	9
KŌBE									
Jan	24	9	9	3	1	6	24	23	1
Feb	26	7	7	3	2	7	24	22	2
Mar	28	10	9	4	2	9	18	19	1
Apr	24	12	14	5	4	11	15	13	2
May	21	12	13	6	5	14	14	13	2
Jun	16	12	13	6	5	16	18	11	3
Jul	15	11	11	6	5	19	18	12	3
Aug	17	16	20	7	4	12	12	11	1
Sep	25	17	16	6	4	9	10	11	2
Oct	35	15	11	5	2	4	9	17	2
Nov	32	14	11	3	1	4	15	19	1
Dec	22	7	7	2	1	5	28	26	2
Ann	24	12	12	5	3	10	16	16	2
ŌSAKA									
Jan	16	21	7	2	2	9	26	14	3
Feb	21	21	6	2	2	10	21	15	2
Mar	23	27	7	2	2	10	15	12	2
Apr	19	31	9	3	3	11	15	8	1
May	16	26	8	3	3	14	18	8	4
Jun	13	25	8	2	4	16	21	7	4
Jul	11	20	8	2	4	18	26	7	4
Aug	13	25	11	3	3	14	19	8	4
Sep	19	35	12	4	3	8	10	6	3
Oct	24	38	11	3	2	5	8	7	2
Nov	20	23	11	3	2	6	13	10	2
Dec	16	22	8	3	2	7	26	14	2
Ann	18	27	9	3	3	11	18	9	2
KYŌTO									
Jan	17	13	4	3	9	14	11	13	16
Feb	15	11	4	4	8	14	14	16	14
Mar	22	13	8	4	9	10	9	18	7
Apr	22	17	13	7	9	7	4	13	8
May	19	20	14	8	12	7	5	6	9
Jun	15	18	14	7	13	9	4	8	12
Jul	9	18	23	9	12	8	4	4	13
Aug	14	19	18	8	11	8	3	5	14
Sep	22	20	10	4	6	6	6	9	17
Oct	28	17	8	3	6	7	8	8	15
Nov	23	9	6	3	7	10	10	17	15
Dec	14	9	3	3	10	16	14	13	18
Ann	18	15	10	5	9	10	8	12	13
NAGOYA									
Jan	26	6	2	2	1	2	16	44	1
Feb	24	6	2	2	2	2	15	46	1
Mar	22	4	2	4	4	4	16	43	1
Apr	18	4	5	11	9	8	12	32	1
May	18	5	7	13	12	8	12	24	1
Jun	12	5	5	17	18	11	12	19	1
Jul	12	5	6	20	16	12	11	16	2
Aug	14	7	8	19	16	11	10	14	1
Sep	21	6	5	15	10	7	9	26	1
Oct	32	6	2	3	4	5	11	37	1
Nov	28	3	3	3	3	33	13	40	1
Dec	28	7	3	2	2	2	17	38	1
Ann	21	6	4	9	8	6	13	32	1

TABLE V - 34.
MEAN WIND SPEED (M.P.H.)

STATIONS	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	YR
Kagoshima	7.2	7.6	7.6	6.9	6.7	6.0	6.3	6.7	6.9	6.9	6.9	6.9	6.9
Nagasaki	8.5	8.5	9.2	8.9	7.8	8.3	8.7	7.8	7.2	6.9	7.2	8.3	8.1
Fukuoka	6.5	6.3	6.3	5.8	5.4	5.1	5.6	4.9	4.5	4.5	5.4	6.5	5.6
Shimonoseki	9.4	8.9	8.7	8.7	8.5	7.4	7.6	7.6	6.3	6.3	7.8	9.4	8.0
Horoshima	4.3	4.5	4.7	4.5	4.0	4.0	4.0	4.3	4.3	4.3	4.3	4.3	4.3
Tokushima	6.5	6.7	6.3	5.8	5.1	4.3	4.0	4.3	4.5	4.9	5.4	6.3	5.3
Kōbe	5.8	5.8	5.8	5.6	5.4	5.1	5.1	5.6	5.6	5.4	5.6	6.3	5.6
Ōsaka	7.2	7.2	6.9	6.5	6.3	6.0	6.3	6.3	6.0	5.6	6.0	7.4	6.5
Kyōto	3.8	4.0	4.3	4.3	4.0	3.6	3.6	3.8	3.1	2.9	2.9	3.4	3.6
Nagoya	5.8	6.5	6.7	6.5	5.8	5.1	5.1	4.9	4.9	4.9	5.1	5.4	5.6

TABLE V - 35.
AVERAGE NUMBER OF DAYS WITH GALES
(Wind speed 34 m.p.h. or greater)

STATIONS	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	YR
Kagoshima	1	2	1	2	2	1	0	0	1	1	2	0	13
Nagasaki	0.0	0.4	0.2	1.0	0.1	1.0	1.0	0.1	0.4	0.0	0.0	0.6	4.8
Fukuoka	1	1	1	1	0	0	0	0	0	0	1	1	7
Shimonoseki	3	4	4	4	3	2	1	1	1	1	3	4	31
Hiroshima	0.2	0.1	0.3	0.7	0.0	0.3	0.0	0.3	0.0	0.1	0.0	0.0	2.0
Tokushima	1	0	1	0	0	0	0	0	0	0	0	0	2
Kōbe	0	0	2	0	1	0	1	0	0	0	1	0	5
Ōsaka	0.2	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.2	0.5
Kyōto	–	–	–	–	–	–	–	–	–	–	–	–	0
Nagoya	0	1	2	1	1	0	0	1	0	0	1	1	8

TABLE V - 36.
FREQUENCY OF VELOCITY GROUPS FOR SELECTED FLOW TYPES IN KYŪSHŪ, SHIKOKU AND SOUTHWEST HONSHŪ
1—<13 m.p.h.
2— 13-38 m.p.h.
3—>38 m.p.h.

	WINTER			SPRING			SUMMER			AUTUMN		
FLOW TYPES	1	2	3	1	2	3	1	2	3	1	2	3
NE	10	74	16	7	55	38	21	71	8	12	74	14
E	6	73	21	9	78	13	34	56	10	17	68	15
SE	5	75	20	3	81	16	25	66	9	18	67	15
S	0	78	22	8	74	18	42	48	10	7	74	19
SW	10	70	20	10	70	20	35	59	6	19	66	15
W	12	69	19	5	88	7	25	74	1	10	84	6
NW	14	74	22	6	71	23	28	65	7	9	84	7
N	2	79	19	3	60	37	35	65	0	13	58	29
Ridge & *High*	59	38	3	64	34	2	78	22	0	74	24	2
Trough & *Low*	16	62	22	8	54	38	28	55	17	13	70	17
Col & Var	100	0	0	100	0	0	97	2	1	99	1	0

Note: Based on 0600 and 1800 L.C.T. observations.

TABLE V - 37.

FREQUENCY OF VELOCITY GROUPS FOR SELECTED FLOW TYPES

KYŪSHŪ, SHIKOKU, AND SOUTHWEST HONSHŪ
(average number of days per year)

1—<13 m.p.h.
2— 13-38 m.p.h.
3—>38 m.p.h.

	WINTER			SPRING			SUMMER			AUTUMN		
FLOW TYPES	1	2	3	1	2	3	1	2	3	1	2	3
NE	3	19	4	2	12	8	2	7	1	4	20	4
E	*	4	1	1	5	1	1	2	*	2	6	1
SE	*	2	1	*	5	1	3	8	1	2	6	1
S	0	1	*	*	4	1	3	3	1	*	2	*
SW	*	2	1	1	8	2	8	14	1	1	2	1
W	*	1	*	*	2	*	1	3	*	*	1	*
NW	1	13	4	*	5	2	1	2	*	1	7	1
N	*	12	3	*	3	2	*	1	0	1	4	1
Ridge & *High*	8	5	*	12	6	*	10	3	0	12	4	*
Trough & *Low*	*	1	*	*	2	1	2	4	1	*	2	
Col. & Var	2	0	0	3	0	0	5	*	*	6	*	0

* Less than 0.5 day

TABLE V - 38.
MEAN NUMBER OF CLEAR DAYS (<20% CLOUD COVER)

STATIONS	DEC	JAN	FEB	WIN	MAR	APR	MAY	SPR	JUN	JUL	AUG	SUM	SEP	OCT	NOV	AUT	YR
Kagoshima	7	5	4	16	4	3	4	11	1	3	4	8	4	7	8	19	54
Nagasaki	3	2	2	7	3	3	4	10	1	2	4	7	4	7	6	17	40
Fukuoka	2	2	2	6	3	4	5	12	2	3	5	10	4	6	5	15	42
Ōita	5	5	3	13	4	4	3	11	2	3	5	10	3	5	6	14	48
Shimonoseki	2	1	2	5	3	4	4	11	2	2	5	9	3	5	4	12	36
Hiroshima	3	2	2	7	3	4	4	11	1	2	4	7	2	5	5	12	36
Hamada	1	1	1	3	2	4	4	10	2	3	6	11	3	4	3	10	33
Ashizuri	8	6	5	19	6	5	2	13	1	4	5	10	2	8	8	18	60
Kōchi	10	8	5	23	4	4	3	11	1	1	3	5	2	6	8	17	54
Tokushima	5	4	3	12	3	4	4	11	1	3	5	9	2	4	5	11	42
Shiono-misaki	9	10	7	26	6	4	3	13	2	3	4	9	3	5	7	15	64
Kōbe	5	3	2	10	3	3	4	10	1	1	3	5	2	5	6	13	37
Ōsaka	4	4	3	11	3	4	4	11	2	2	4	8	3	5	6	14	43
Kyōto	3	2	1	6	2	3	3	8	1	2	3	6	2	4	4	10	30
Miyazu	1	1	*	2	2	2	3	7	1	2	4	7	1	2	2	5	20
Nagoya	6	6	5	17	5	5	5	15	2	2	4	8	3	7	8	18	57
Hamamatsu	11	11	8	30	7	4	3	14	1	1	4	6	2	5	9	16	67

TABLE V - 39.
MEAN NUMBER OF PARTLY CLOUDY DAYS
(20%-80% CLOUD COVER)

STATIONS	DEC	JAN	FEB	WIN	MAR	APR	MAY	SPR	JUN	JUL	AUG	SUM	SEP	OCT	NOV	AUT	YR
Kagoshima	17	17	14	48	15	13	12	40	9	15	19	43	16	14	14	44	177
Nagasaki	16	16	13	45	15	14	13	42	9	13	18	40	14	14	15	43	172
Fukuoka	17	16	14	47	16	14	13	43	11	15	18	44	14	16	17	47	182
Ōita	20	18	16	54	16	13	14	43	9	14	16	39	13	15	16	44	181
Shimonoseki	17	16	13	46	16	15	15	46	11	17	18	46	15	17	18	50	189
Hiroshima	20	19	17	56	17	14	14	45	12	14	18	44	14	17	18	49	196
Hamada	11	9	9	29	14	13	14	41	10	14	15	39	13	15	14	42	152
Ashizuri	17	18	14	49	17	13	13	43	9	13	15	37	14	12	14	40	168
Kōchi	16	17	15	48	16	12	12	40	9	12	16	37	12	13	14	39	164
Tokushima	20	21	17	58	18	14	14	46	11	15	17	43	15	15	17	47	197
Shiono-misaki	16	15	13	44	17	13	13	43	8	13	16	37	13	13	14	40	161
Kōbe	21	22	19	62	18	15	13	46	11	16	18	45	14	15	17	46	201
Ōsaka	22	21	18	61	19	14	14	47	11	17	20	48	15	16	18	49	207
Kyōto	22	20	17	59	18	14	14	46	11	13	18	42	13	16	19	48	195
Miyazu	13	9	8	30	9	13	12	34	10	12	15	37	12	14	14	40	142
Nagoya	20	20	18	58	18	13	13	44	11	15	17	43	13	13	16	42	188
Hamamatsu	15	15	13	43	15	12	13	40	10	14	15	39	13	13	14	40	161

TABLE V - 40.
MEAN NUMBER OF CLOUDY DAYS (>80% CLOUD COVER)

STATIONS	DEC	JAN	FEB	WIN	MAR	APR	MAY	SPR	JUN	JUL	AUG	SUM	SEP	OCT	NOV	AUT	YR
Kagoshima	7	9	10	26	12	14	15	41	20	13	8	41	10	10	8	28	134
Nagasaki	12	13	13	38	13	13	14	40	20	15	9	45	12	10	9	31	153
Fukuoka	12	13	12	37	12	12	13	37	17	13	8	38	12	9	8	29	141
Oita	6	8	9	23	11	13	14	38	19	14	10	43	14	11	8	33	136
Shimonoseki	12	14	13	39	12	11	12	35	17	12	8	37	12	9	8	29	140
Hiroshima	8	10	9	27	11	12	13	36	17	15	9	41	14	9	7	30	133
Hamada	19	21	18	58	15	13	13	41	18	14	10	42	14	12	13	39	180
Ashizuri	6	7	9	22	8	12	16	36	20	14	11	45	14	11	8	33	137
Kochi	5	6	8	19	11	14	16	41	20	18	12	50	16	12	8	36	147
Tokushima	6	6	8	20	10	12	13	35	18	13	9	40	13	12	8	33	126
Shiono-misaki	6	6	8	20	8	13	15	36	20	15	11	46	14	13	9	36	140
Kobe	5	6	7	18	10	12	14	36	18	14	10	42	14	11	7	32	127
Osaka	5	6	7	18	9	12	13	34	17	12	7	36	12	10	6	28	115
Kyoto	6	9	10	25	11	13	14	38	18	16	10	44	15	11	7	33	140
Miyazu	17	21	20	58	20	15	16	51	19	17	12	48	17	15	14	46	203
Nagoya	5	5	5	15	8	12	13	33	17	14	10	41	14	11	6	31	120
Hamamatsu	5	5	7	17	9	14	15	38	19	16	12	47	15	13	7	35	137

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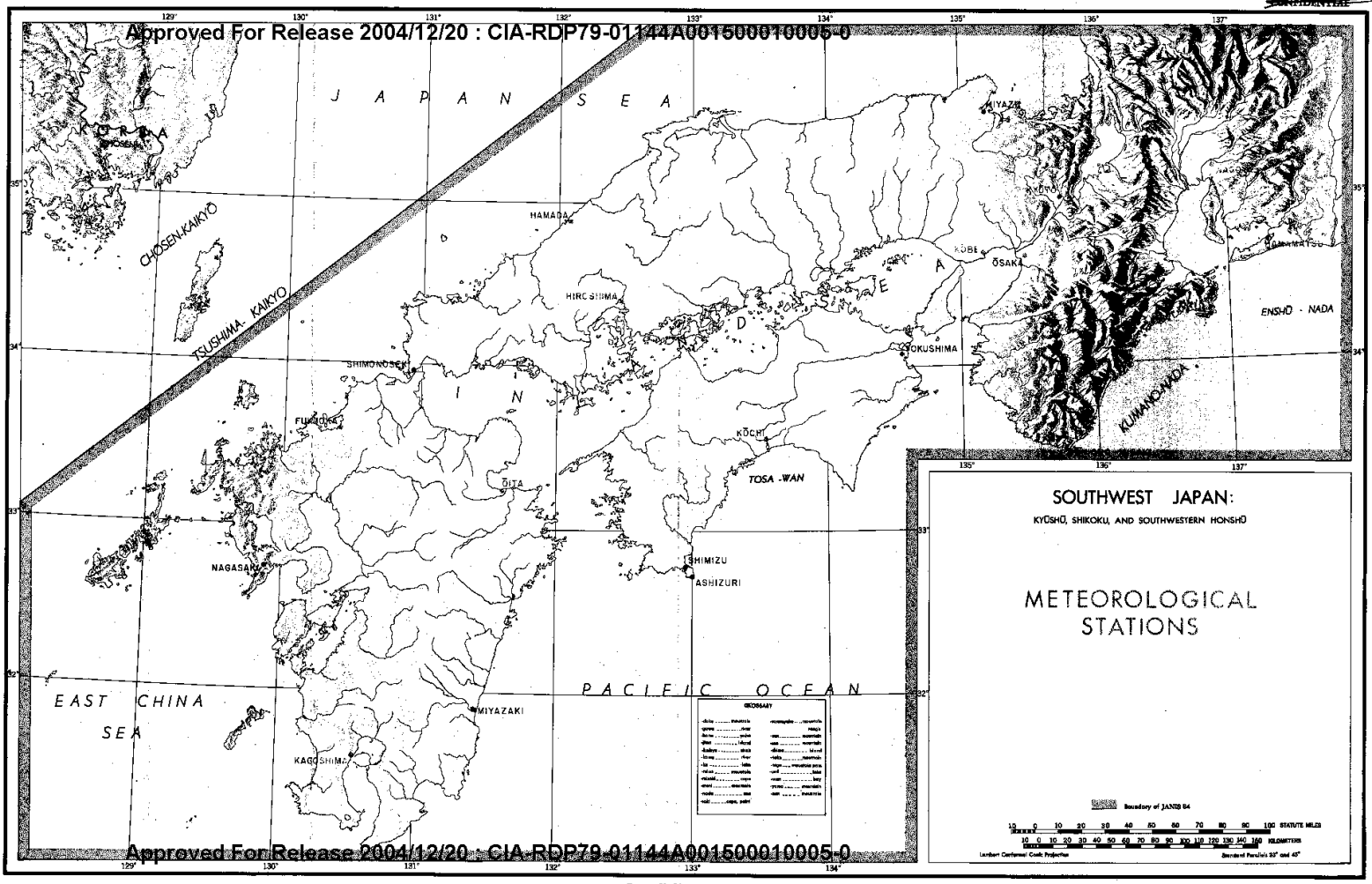


FIGURE V - 31.
Location of Weather Stations.

(3) Outbreak of summer type circulation.

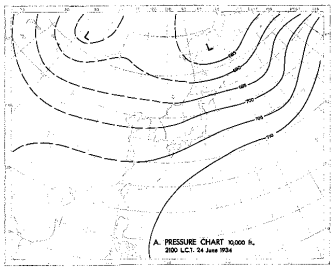
The surface maps of June 24-26, 1934, show the development of the Southwest Monsoon, or summer circulation, over eastern Asia. The Polar Front recedes northward toward Hokkaido and a thermal *low* develops over the Asiatic Continent. Pre-warm-frontal rains, preceding the recession of the Polar Front over Japan, result in the so-called "Bai-U" or "Plum rains" in late June and early July. It is common for a ridge of the Pacific cell to prevail over Formosa during the development of the monsoon, yielding to a southerly or southwesterly air flow as the summer circulation persists.

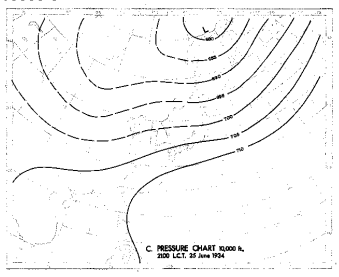
LEGEND
FOR WEATHER AND PRESSURE CHARTS

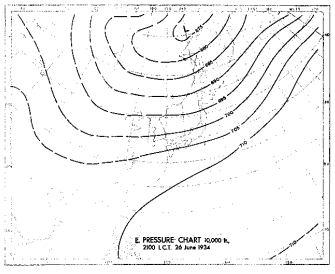
- Cold Front
- Warm Front
- Occluded Front
- Stationary Front
- Frontolysis
- —1043— Pressure in Millibars

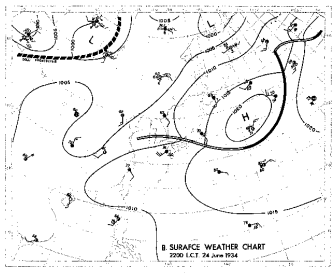
STATION MODEL

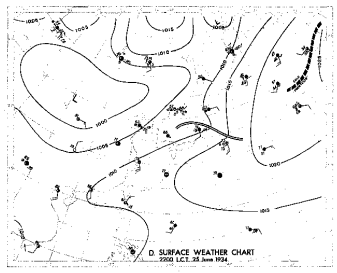
TT	Temperature
T_dT_d	Dewpoint Temperature
RR	Amount of Precipitation
W	Past Weather
V	Visibility
N	Cloud Coverage
	Station Circle
	Wind Direction
	Wind Speed (1 barb = 2 on Beaufort Scale)
C_L	Type of Lower Cloud
C_M	Type of Middle Cloud
C_H	Type of High Cloud
N_h	Number of Low Clouds
h	Height of Low Clouds
5pp	Amount of Barometric Change
a	Barometric Tendency
ww	Present Weather











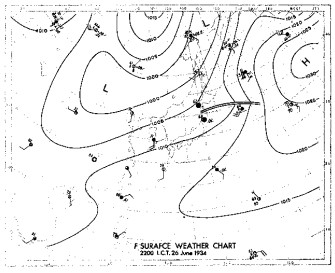
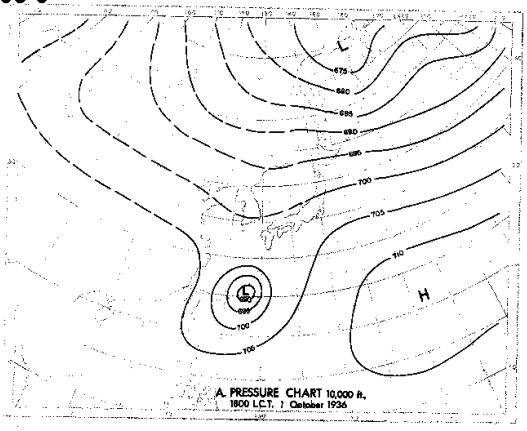


FIGURE V - 28.
Typical Summer Circulation

(4) Break-up of summer type circulation.

The surface map of October 1, 1936, was chosen to illustrate the break-up of the summer circulation. The summer trough has receded southward from the interior of China into the South China Sea. At the same time, a typhoon which will move northward and eastward, skirting the Japanese islands, is centered northeast of Formosa. The southward push of the Polar Front and the development of typhoons between the Marianas and Formosa are characteristic of the fall weather maps.

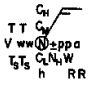


A. PRESSURE CHART 10,000 ft.
1800 L.C.T. 1 October 1936

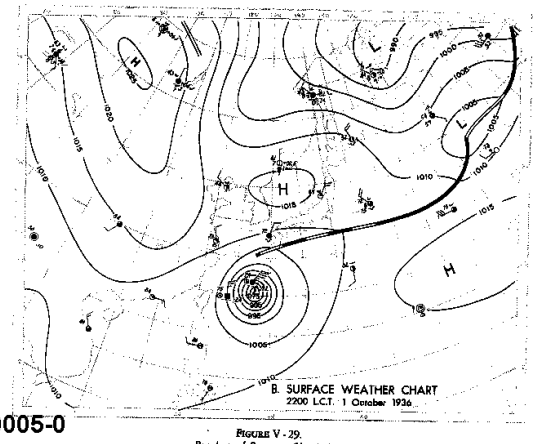
LEGEND
FOR WEATHER AND PRESSURE CHARTS

- Cold Front
- Warm Front
- Occluded Front
- Stationary Front
- Frontolysis
- —1043— Pressure in Millibars

STATION MODEL



TT	Temperature	C_L	Type of Lower Cloud
$T_S T_S$	Dewpoint Temperature	C_M	Type of Middle Cloud
RR	Amount of Precipitation	C_H	Type of High Cloud
W	Past Weather	N_H	Number of Low Clouds
V	Visibility	h	Height of Low Clouds
N	Cloud Coverage	±pp	Amount of Barometric Change
	Station Circle	a	Barometric Tendency
	Wind Direction	ww	Present Weather
	Wind Speed (1 Barb = 2 on Beaufort Scale)		



B. SURFACE WEATHER CHART
2200 L.C.T. 1 October 1936

FIGURE V - 29.
Breakup of Summer Circulation.

FIGURE V - 29
JANIS 84

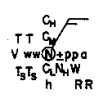
(5) *Typhoons.*

Late summer and early fall are the most favorable times for the development of typhoons which pass over this region. The series of maps from October 2 to 5, 1936, shows a typhoon moving from a point south of Kyūshū up the east coast of Honshū. The movement of the typhoon from October 2 to 3 seems extraordinarily rapid (about 46 m.p.h.), but is somewhat obscured by the deepening of the low center approaching Hokkaidō from the west on October 2. Thus, on the map of October 3, it is possible to identify the low center near Urakawa on Hokkaidō with the storm approaching Hokkaidō from the west on the previous day, rather than with the typhoon center. The deepening of the low center, however, would undoubtedly be due to the typhoon.

L E G E N D
FOR WEATHER AND PRESSURE CHARTS

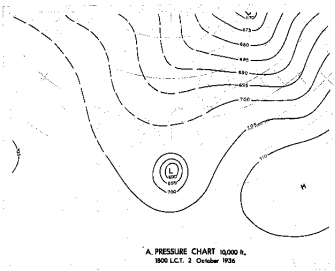
- Cold Front
- Warm Front
- Occluded Front
- Stationary Front
- Frontolysis
- —1043— Pressure in Millibars

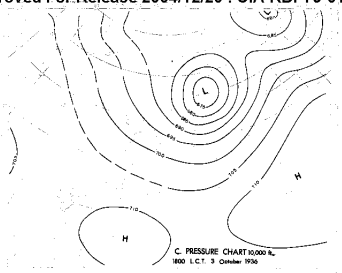
STATION MODEL

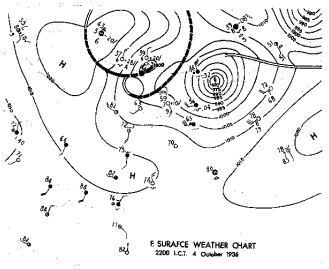


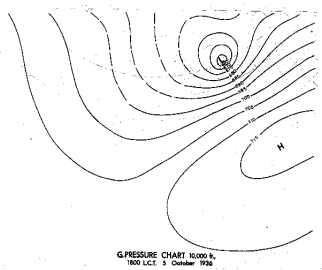
TT	Temperature
T_sT_s	Dewpoint Temperature
RR	Amount of Precipitation
W	Past Weather
V	Visibility
N	Cloud Coverage
	Station Circle
	Wind Direction
	Wind Speed (1 Barb = 2 on Beaufort Scale)

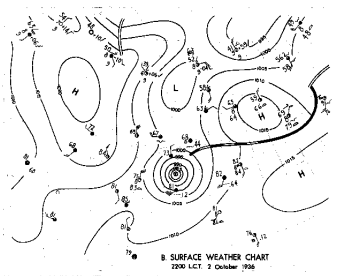
C_L	Type of Lower Cloud
C_M	Type of Middle Cloud
C_H	Type of High Cloud
N_h	Number of Low Clouds
h	Height of Low Clouds
±pp	Amount of Barometric Change
a	Barometric Tendency
ww	Present Weather

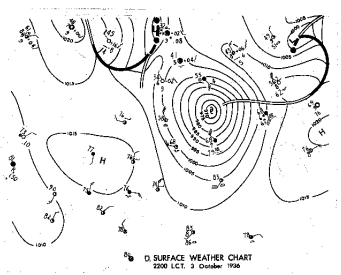


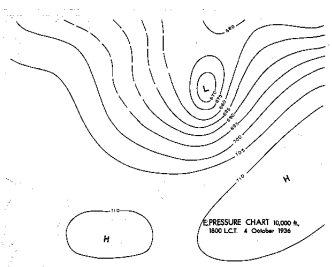












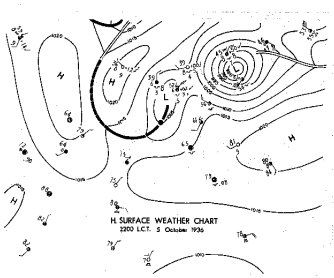
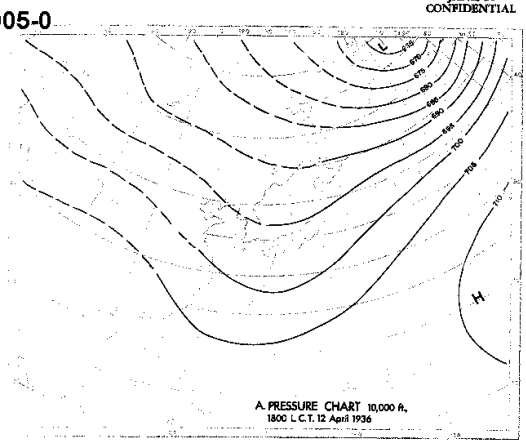


FIGURE V - 30
Example of Typhoon

(2) ***Breakdown of winter type circulation.***

The surface map of April 12, 1936, was chosen to illustrate the breakdown of the winter monsoon circulation. The Siberian *High* has been split in two by a frontal movement across Siberia from the northwest to the southeast. Though a high-pressure system is following the front, it is not of the dimensions or strength of the winter Siberian *High*. The moving high-pressure cells generally travel in an eastward direction across Kyūshū, Shikoku, and southwestern Honshū.



L E G E N D
FOR WEATHER AND PRESSURE CHARTS

- Cold Front
- Warm Front
- Occluded Front
- Stationary Front
- Frontolysis
- —1043— Pressure in Millibars

STATION MODEL

TT	Temperature
$T_S T_S$	Dewpoint Temperature
RR	Amount of Precipitation
W	Past Weather
V	Visibility
N	Cloud Coverage
	Station Circle
	Wind Direction
	Wind Speed (1 Barb = 2 on Beaufort Scale)
C_L	Type of Lower Cloud
C_M	Type of Middle Cloud
C_H	Type of High Cloud
N_H	Number of Low Clouds
h	Height of Low Clouds
±pp	Amount of Barometric Change
a	Barometric Tendency
ww	Present Weather

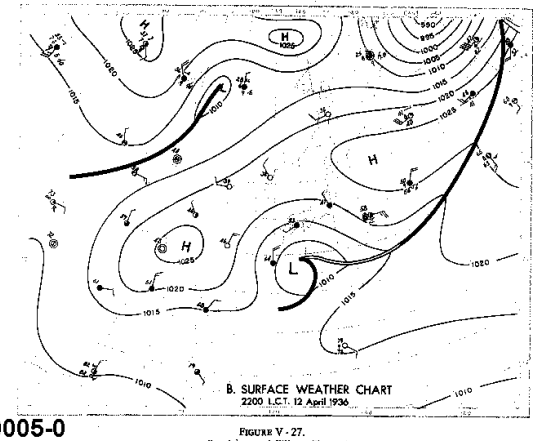
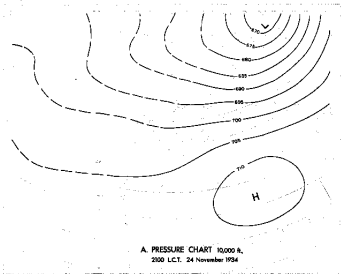
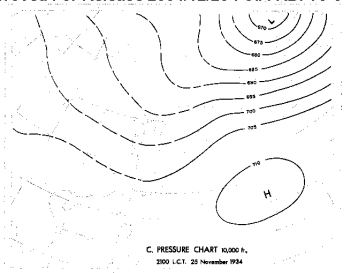


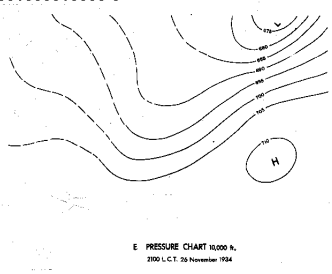
FIGURE V - 27.
Breakdown of Winter Type.



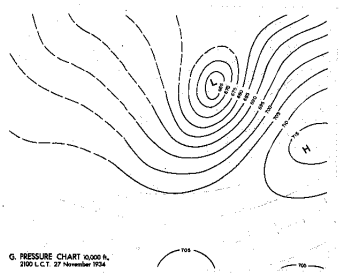
A. PRESSURE CHART 10,000 ft.
2100 L.C.T. 24 November 1934



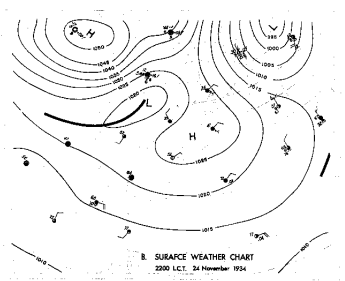
C. PRESSURE CHART 10,000 ft.
2100 L.C.T. 25 November 1934



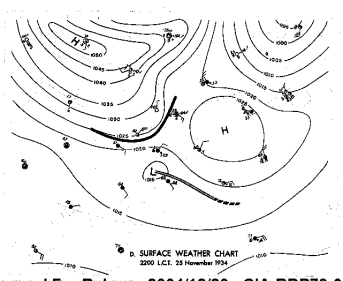
E. PRESSURE CHART 10,000 ft.
2100 L.C.T. 26 November 1934



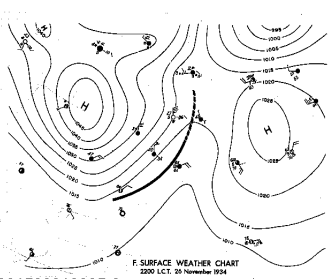
G. PRESSURE CHART 10,000 ft.
2100 L.C.T. 27 November 1934



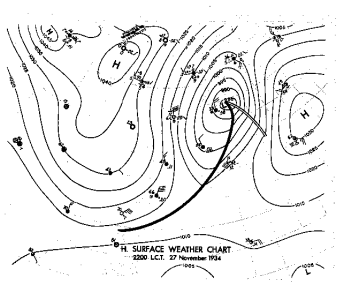
B. SURAFCE WEATHER CHART
2200 L.C.T. 24 November 1934



D. SURFACE WEATHER CHART
2200 L.C.T. 25 November 1934



F. SURFACE WEATHER CHART
2200 L.C.T. 26 November 1934



H. SURFACE WEATHER CHART
2200 L.C.T. 27 November 1934

FIGURE V - 26.
Outbreak of Warm Type